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H. A. Dalby.

Train Rules and Train Dispatching

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A PRACTICAL GUIDE FOR TRAIN DISPATCHERS, ENGINEMEN, TRAINMEN AND ALL WHO HAVE TO DO WITH THE MOVEMENT OF TRAINS

▼ ▼ ▼

By H. A. Dalby

▼ ▼ ▼

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1904

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Introduction.

Almost from the beginning of American railroading there have been train dispatchers. The telegraph was scarcely in existence when its adaptability to the business of single track train movement became evident. All American railways in the early days were single track, ill equipped, inadequately built; poor in pocket, but rich in men of energy, adaptability and resourcefulness. Train movement was irregular and train rules crude, as was natural in a new industry which was as yet an experiment. The telegraph made improvement possible, and with its advent as an adjunct to railway operation, the train dispatcher came into existence. He was and is purely American. From the first, he was recognized as necessary to facility of train movement and success of operation. Through his agency, delays were minimized without sacrifice of safety, authority centralized, the way of the trainman made plain and easy and the possibilities of single track railroading developed

in the handling of heavy traffic at low expense to an extent that has gridironed the continent with its "twin bands of steel."

Today, as fifty years ago, the train dispatcher is an indispensable factor in the successful operation of American railways. He has grown with the growth of railway transportation; his hand still controls the levers of the huge machine into which it has developed, and his eye watches with sleepless vigilance the movement of the trains which are the threads that, weaving in and out in ceaseless motion, constitute the mighty web of a continental commerce.

How he does it is the story of this book, and the story is well and worthily told.

JOHN F. MACKIE.

In the Beginning.

History records that on a certain day in the year 1851, two passenger trains, in opposite directions, were running over what is now a part of the Erie System, between Jersey City and Port Jervis. The general superintendent, Charles Minot, was on the east bound train, which was in charge of Conductor W. H. Stewart and Engineer Isaac Lewis. A telegraph line had recently been erected along that portion of the road and was looked upon as a great curiosity. There were some who went so far as to express a hope that it would some day be of practical value, but of this the majority were doubtful.

On the day in question, the east bound train reached Monroe, where it was scheduled to meet the opposing train. The latter did not appear in a reasonable time and the general superintendent, going to the telegraph office, obtained information that it was a half hour or more late. It occurred to him that the trains should meet at Turner's, the next

station beyond. He accordingly wired instructions to the conductor of the other train to wait at that station until the east bound train should arrive. He then wrote instructions to Conductor Stewart and Engineer Lewis explaining that the west bound train had been instructed to wait for them; but upon presentation to the engineer, that official promptly declined to move the train. Rules were as strict in those days as they are now and he evidently had little faith in the novel means of communication by which the arrangement was effected. He remained firm in his refusal and Mr. Minot himself mounted the engine, so we are told, and ran to the next station, where the opposing train was safely met.

This incident, it is claimed, was the first in which the movement of trains was authorized by telegraph. Train men were skeptical as to its efficiency and some openly expressed a hope that a disastrous accident might occur which would have the effect of abandoning the new order of things and cause a return to what was considered the only safe authority for train movements, the time table. But the "good old days" never returned and the operation of the hundreds of thousands of miles of our American railways is now presided over by thousands of train dispatchers.

Upon these men, with the assistance of operators, conductors and engineers, depends the prompt movement of the immense traffic of our

country. This has assumed such proportions in the past few years that the matter of getting trains over the road with the greatest dispatch consistent with safety, is constantly forcing itself more and more to the front. Shortage of power, constant demand for cars, clamor of shippers for better service and keen competition between railroads, force the question to the traffic and transportation departments, and finally reach a vital point in the whole situation, the expeditious movement of trains, with all that pertains thereto.

The author does not claim exceptional experience or ability. Neither does he claim to approach perfection. On the contrary, the major portion of what is offered has been brought home forcibly by the mistakes made. Many things have been revealed by *afterthought* which do not appear in the light of *forethought.* In other words, it is much easier to tell how things *should have been* done than to say how they *shall be* done.

I trust, therefore, that what I have to say may be accepted, not as a criticism upon the work of others, but only as a series of suggestions which have come to me from time to time.

In offering suggestions to dispatchers they are intended only for those who feel that such suggestions will be of benefit. In speaking to conductors and engineers the author expresses himself as it appears from his stand-

tion there was no uniformity of rules among different systems, each having its own code. Forms of train orders were not prescribed and dispatchers sent orders in the language which best suited them. Sometimes trainmen understood them and sometimes they did not. The American Railway Association invited the cooperation of all roads for the consideration of the subject and the result was the production of the Standard Code, which is, without doubt, all things considered, the best that has yet been devised.

It should be understood that there is nothing compulsory about its adoption. In fact, we know of no line which has adopted it in its entirety, each line making more or less variation to suit its own requirements, yet its rules may still be termed "Standard."

It is not the intention, in fact, to make the rules too binding. Many places are left blank, as will be seen, the individual road to fill them as best suits its own needs. It will be seen that of rules 4 and 221, for instance, there are two optional forms, either of which may be adopted.

The present edition of the Code is much more brief than it was originally, the Association desiring to leave room for each system to amplify any rule which does not seem sufficiently clear. Some roads have added much in the way of explanation, while others have made but little alteration. There are still a

few roads where the Code is not in use, but its value and the value of having a practically uniform code on all roads is recognized, and it is rapidly coming into general use.

In discussing or explaining the rules in the pages which are to follow, positive statements are only made where the author is sure that such is the general understanding. In the case of a rule or a form of train order which is not sufficiently clear in itself, we may be able to tell how it is understood on different roads, but it requires a ruling by the American Railway Association in order that any particular interpretation may be termed "Standard."

The reader should understand that, although we have the Standard Code, by reason of varying conditions on different systems as well as the great divergence of opinions with regard to details, we are still far from complete uniformity. The writer is not surprised, therefore, when someone offers a contrary view, neither is he averse to hearing the views of others or participating in any discussion whereby more light may be obtained.

Standard Time.

The establishment of Standard Time was the first work of the Association referred to in the preceding section. It is impossible to use the same time throughout the country, but this system makes the difference in even hours and as it has been adopted by cities and towns to conform to railroad standards, it is much less confusing than when local or "sun" time was in use by cities, and each road was governed by a time of its own selection.

Reference to the map will show that the time for the different sections of the country is fixed by a certain meridian, these meridians being 15 degrees apart. The Standard for the section on either side of such meridian is the actual time *at* the meridian. As the distance grows farther away from the meridian the greater is the difference between "Standard" and "local" time, which latter is little used, if at all.

Accompanying the diagram is a list of the railroad points where the different "Standards"

ng the time on the east one hour
n that on the west.

ains and Train Signals.

ll to understand just what is meant,
ical sense, by a "train." In the list
ons we find the following:
1.—An engine, or more than one
coupled, with or without cars, dis-
Markers.
e seen that cars are not a necessary
hat, in this sense, is termed a train.
e, if properly equipped, may come
provisions of the definition.
rring to the diagrams beginning on
we find illustrations of the *necessary*
Rule 19 provides for signals on the
very train; a green flag by day and
or red light by night. This rule is
whether the rear of the train be a
or a freight car, or whether it be
of the engine. In the latter event
on of the Markers is shown in the
fourth diagrams. The importance
the rear of the train so marked will
in subsequent chapters.
7 provides for the headlight on all
er dark. This rule also applies to
n, whether the engine be at the head
in or elsewhere. The last three dia-
istrate the position of the white light

when the regular headlight of the engine cannot be used.

The headlight and the markers always appear on the particular part of the train which they indicate, but the classification signals, i. e., green flags or lights to indicate a following section, and white ones to indicate that the train is an extra, are always located in a specified place on the engine, no matter in what part of the train it may be. On almost every road classification signals are carried in the position indicated by the Standard Code, though I have seen such signals carried on the pilot beam. Flags are usually of cloth, but a few roads have them made of tin or sheet iron, painted green or white. A cloth flag, however, placed on the side of the boiler or on the hand rail of the engine makes the most conspicuous and distinct signal.

When more than one engine is attached to a train, the general practice is for the leading engine only to display classification signals.

Additional provisions in Rules 17 and 19 require that when a train has taken the siding to meet or be passed by other trains, the headlight shall be covered and the lights on the rear be changed from red to green. Until this is done they serve as "caution" signals to trains in either direction.

Time Tables.

TIME TABLE.—The authority for the movement of regular trains subject to the rules. It contains the classified schedules of trains with special instructions relating thereto.

While forms of time tables differ on different lines, there are some essential particulars which are common to all. They are numbered consecutively as they are issued, the new one entirely superseding the old (with certain exceptions, explained in the rules), the moment it takes effect.

The schedules form the most prominent part of the time table. The schedule (See definition, page 130) indicates the number of the train, its class, the days of the week on which it is due to start, its initial point and the time of arrival or departure at each station. These provisions should be thoroughly understood, as they are of vital importance to the American system of train movements. Each point, therefore, is taken up separately.

THE SCHEDULE. I wish to impress on the reader the distinction between a *schedule* and a *train*. The former is the column on the time table to which we have referred, while the latter is, according to the Standard Code definition, "an engine, or more than one engine coupled," etc. Any *train*, or more than one train, may run on a *schedule;* therefore, when we speak, for instance, of No. 5 or 1st No. 5, we mean the *train* that is running on *schedule* No. 5, or the first train running on that schedule, as the case may be. The schedule means that there is a train, or more than one train, if necessary, due to run according to the provisions indicated.

CLASS. The usual way of designating the different classes of schedules is by 1st., 2d., 3d., etc., though they are sometimes designated as "passenger" and "freight." This subject is fully treated in a later section.

DAYS IN EFFECT. The days of the week on which the schedule is in effect are designated at the top of the column by "Daily," "Daily except Sunday," "Sunday only," etc. The date of the schedule is taken from the day on which the train is due to *start;* thus, if it is due to leave its initial point at 11:55 p. m. December 15th, it is the train of the 15th throughout its entire trip, even though it may be actually run on the 16th.

TIMES AT STATIONS. Where but one time is shown at a station it is the *leaving* time,

unless it is otherwise indicated. Where there is an arriving time shown, the train is not permitted to arrive before that time (Rule 92), but where there is no arriving time it may arrive as soon as it can after leaving the last station where it is timed, unless there is a contrary rule.

Usually an arriving time is shown only at the terminal station or where a train is scheduled to meet or be passed by one or more other trains. A train being prohibited from arriving at a station in advance of its arriving time when shown, other trains which may be working at the station or running ahead of it can be governed accordingly.

Although it is commonly accepted that where no arriving time is shown the train is due to arrive immediately after it is due to leave the last station, and while this is correct as a theory, in practice it is open to objection, and a strict adherence would be a detriment to the movement of an inferior train running ahead of a superior. For instance, No. 96, a freight train, is scheduled to leave A at 11 o'clock and B (7 miles) at 11:30: an extra running in the same direction, according to the last paragraph of Rule 89, would be required to be on the siding at B at 10:55 p. m., as No. 96 is due, or permitted, to arrive at that point immediately after it is due to leave A, which is 11 o'clock. It may be that No. 96 cannot possibly run from A to B in less than 20 minutes,

in which case there would be that much loss of time to the extra if this interpretation were strictly carried out. This is seldom strictly adhered to and the fact that the superior train cannot possibly arrive at a station until it has had time to run from the last one, figures very largely in the calculation of an inferior train running ahead. Usually such train figures only to observe the clearing time *at the station* where it takes the siding, and generally speaking, this is safe, though not strictly rulable.

MINIMUM RUNNING TIME. On some time tables this inconsistency is partially overcome by what is known as a "minimum running time" between stations. This is usually applied to freight trains and is indicated by figures between the stations showing the number of minutes which must be used. This constitutes an arriving time at every station where there is none shown on the schedule of the train, and other trains can be governed accordingly. Thus, in the example quoted, if the minimum time between A and B was 20 minutes, No. 96 could not arrive at B before 11:20, which would be, in effect, its arriving time.

Another provision for the same purpose is indicated in the following, which we quote from the rules of one of our large systems.

> A first class train must not arrive at a station more than two minutes in advance of its schedule leaving time where no arriving time is shown.

THE INITIAL POINT. This is an important matter. A number of questions in train rules depend on its identity. Generally speaking, a train cannot, without a train order, run on a schedule from any except the initial point. This, however, is only a general statement. Custom, in certain instances and on some roads, is a little different. This subject is fully treated in the next section.

SPECIAL RULES. There are always a number of special rules and instructions on a time table, among which are indicated the location of register stations, yard limits, stations where trains must obtain clearance cards, etc., together with such rules as apply to that particular district or division. In the station column are usually shown the length of side tracks, coal and water stations, day and night telegraph offices and various other items of information. The general rules are printed on some time tables instead of in book form.

Divisions, Districts and Terminals.

These terms, especially the last two, are important, and their identity on each road should be established by proper authority.

A DIVISION is the territory under the jurisdiction of one superintendent. It may be all one district or it may be composed of several.

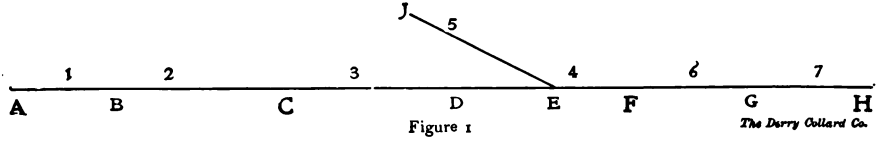

Figure 1

Diagram showing road composed of three divisions. The Central division includes the branch line J to E.

As an illustration, let us suppose a certain road extends from A to H, with a branch from E to J. (Fig. 1.) It is composed of three divisions: the Western Division from A to C, the Central Division from C to F, and the Eastern Division from F to H, each in charge of a division superintendent. The Western Division is composed of the first district extending from A to B and the second district from B to C. The other divisions are similarly divided, the Central Division including a branch line, known as the Fifth District, extending from E to J.

On our imaginary road a time table is printed for each division. One page of the time table is devoted to each district. For the Central Division there are three pages. The third and fourth districts are each 115 miles in length and the fifth district is 25 miles. One dispatcher handles the third district and another the fourth and fifth. Passenger train crews run between C and F on the third and fourth districts. Freight train crews run on one of these districts only, except that there is one crew that runs on the fourth and fifth district only.

In the application of train rules and in the movement of trains, each district is separate and distinct in itself. Each district terminal is considered the initial or terminal station for trains arriving at or leaving that point. For instance, if No. 2 runs over the entire road

from A to H, the initial point for the third district is C; for the fourth district it is D, etc. The date of the train on each district is determined by the date it is due to leave the district terminal. Thus, if No. 2 were due to leave C at 10:30 p. m. December 15th and D at 2 a. m. December 16th, the date of the train on each district would be governed accordingly. If No. 26 were scheduled to run from J to F, E would be its initial point on the fourth district, and the date of the train on both the fourth and fifth districts would be determined in the same manner as above described.

A correct and uniform understanding of the "initial point" and the "district terminal" is essential to the proper application of several rules and the government of trains under certain conditions. I have described what I believe to be the usual practice, yet I am aware of the fact that these matters are not always determined by rule and that custom and individual training has much to do with the way they are understood.

For instance, it is generally accepted that a train may start from a district terminal and fill a time table schedule without a train order authorizing it to do so, but if it is to assume that schedule at any intermediate point, a train order is necessary. If the initial point and the district terminal are not clearly understood it is easy to see how questions might arise which, while they might not necessarily

cause a serious misunderstanding, might be a source of some delay until the matter could be settled.

I know of one large system where the initial station for each train is the starting point on a superintendent's division and no matter how many districts a train may run over, it has but one "initial point" and but one date for the whole division. The initial point for each train is designated on the time table.

There are different names applied to the subdivisions which have been termed "districts." They may be called "Sections," "Branches," or "Lines," and may be either named or numbered.

Classes and Rights of Trains.

Each train on single track bears a certain relationship to every other train. This relationship, according to time table, is described in the Standard Code as being determined by "class" or "direction."

A TRAIN OF SUPERIOR CLASS is defined as "A train given precedence by time table." This refers to the notation at the top of the schedule and is usually designated as "1st," "2d," etc., 1st class trains being superior to those of the 2d, and so on. (Rule 81.). Almost every road has three classes of trains; 1st for passenger trains, 2d for important freight trains and 3d for local and unimport-

ant freights. I have known one or two roads where there were four classes, two for passenger and two for freight, and some have but two, passenger and freight.

TRAIN OF SUPERIOR DIRECTION. Regular trains in a specified direction are superior to trains of the same class in the opposite direction. The superior direction is sometimes determined by the importance of the traffic, but quite often is arbitrary.

The above superiority is conferred by the provisions of the time table. The superiority conferred by train order is, according to the Standard Code, called "right," and is superior to both "class" and "direction"; that is, when a movement is effected by train order the class or direction of a train is, so far as that movement is concerned, eliminated.

When a regular train becomes twelve hours late, its schedule is dead and all outstanding orders pertaining to that schedule are annulled. (Rules 82 and 220.).

When trains meet on single track the superior train (either by "right," "class" or "direction"), takes the siding. It is usually understood, if not provided for by rule, that when extras meet, the train going in the direction which is inferior for regular trains, takes the siding. (Rule 88.).

The Standard Code makes no provision for a clearance between trains of the same class at meeting points, although there may be found

on some roads a rule requiring the train in the inferior direction to clear the opposing train three or five minutes. A clearance (usually five minutes), is required between trains of different classes, and sometimes, in the case of fast express trains, a clearance of ten or fifteen minutes is required for freight trains. This, however, is intended to give plenty of time for protection in case of accident to the inferior train.

Some years ago there was in use, in connection with the rule of "right by direction," a provision that the superior train should wait at a time table meeting point with a train of the same class, a certain time for the expected train, after which, if it had not arrived, the superior train could proceed, passing each succeeding station not less than thé prescribed number of minutes late until the expected train was met. The time for freight trains was from 30 to 40 minutes and for passenger trains 15 or 20 minutes. This often enabled the inferior train to make a meeting point without help, but the system was used before telegraph facilities were up to the present standard and before the system of train dispatching had reached the present degree of efficiency. Such a rule may still be in effect in a few places, but the Standard Code rule now governs on almost every road.

I know of but one exception, and perhaps it is the only one of its kind. There is a large

New England system where there is no "right by direction." Trains wait indefinitely at time table meeting points for trains of the same class, and a train cannot leave a terminal until all overdue trains of the same class have arrived or are 12 hours late. While this would seem to be a return to methods in use many years ago, yet I am informed that it is entirely satisfactory, having been adopted after using the Standard Code rule for a number of years.

Generally speaking, and considering the equipment and facilities of the average American railroad, I believe the Standard Code is by far the best set of rules for the movement of trains which has yet been formed, but any system of train orders is clumsy at best and much time could be saved if trains could be moved without them. The ideal method would be to govern their movement by signals only. That, of course, is not practicable as yet, although genius and effort are tending toward that end.

CLASS ABOLISHED. On two double track systems the distinction of "class" has been abolished and a train, instead of taking the siding when overtaken by the time of a more important train or having used all the time given to it in case such train is late, simply keeps moving until, by the direction of the dispatcher and indicated by the station signal, it is ordered to take the siding. It will

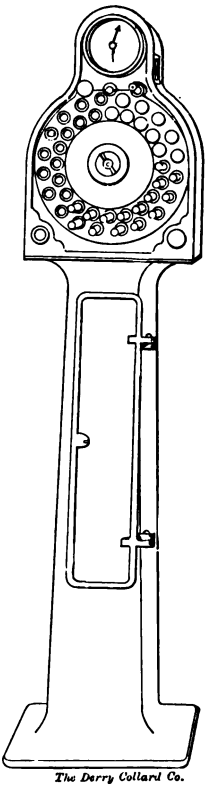

Fig. 2—Staff Instrument.

be seen that by this method the inferior train can often be kept moving ahead of a superior for a much greater distance than by the usual "run late" order, which is, in many ways, very unsatisfactory. As yet this has not been introduced on single track, but with proper signal equipment I believe it could be made practicable.

THE "ELECTRIC STAFF" SYSTEM is in use in a number of places, chiefly on short pieces of single track and at large terminals. It abolishes the distinction of "class" and "direction." The largest installation of this system is on a 23-mile section of the mountainous district of the Santa Fe system. The track is single, is divided into seven "blocks" or "sections," and is equipped with the most approved forms of signaling and interlocking apparatus in connection with the staff system. Trains receive no orders and are governed entirely by signal indications and the possession of the "staff" (a piece of steel from ten to twenty inches in length), without which, a train is not permitted to enter the section of track so controlled.

A staff instrument is located at each end of the section (Fig. 2), in which are accommodations for a number of staffs, but the machines are electrically interlocked so that when a staff has been removed and delivered to a train, no other staff can be taken from either instrument until the first one has been re-

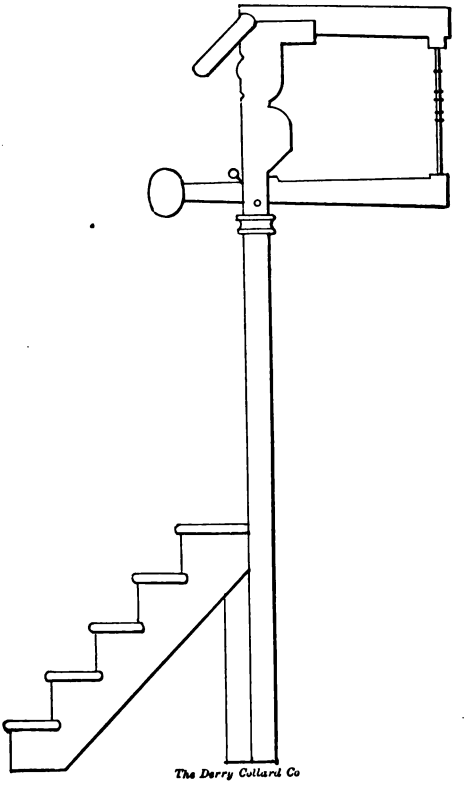

Figure 3

Crane for holding staff so it can be taken at speed.

turned, either to the place from which it was taken or to the instrument at the other end of the section. Thus, only one staff can be in use at a time and as a train cannot enter the section without one, a "positive block" is formed for trains in both directions.

By means of a crane (Fig. 3) the staff can be taken without material reduction of speed, the usual semaphore signals being used to indicate whether the track is clear in the block or section so controlled.

There is a terminal company, operating about ten miles of track, all but two of which is single, where trains are controlled entirely by the position of signals, under the direction of the dispatcher, who, upon information from an operator of an approaching train, replies, "Red," "Green" or "White," according to the signal indications to be given. Red indicates "stop," white "proceed," and green "proceed with caution."

In these three cases, there is no "class," and, on single track, there is no "superior direction."

Train Orders.

Rules 201 to 220 inclusive, prescribe in detail the method of handling train orders. There are printed forms recommended by the Standard Code, on which orders must be written, and this, or something similar, is in general use. They are written on thin tissue paper

and the operator can take from 10 to 15 copies, if necessary. The authorized forms must be used when possible and it is seldom that it is necessary to depart from them, as they are ample to cover every ordinary situation. It may be advisable to add a word or two occasionally in order to make the meaning perfectly plain, but it is seldom necessary to make any radical departure. All the blank spaces should be filled in and there should be no corrections or erasures.

The present edition of the Standard Code leaves a blank in rule 201 for the official whose name is to be signed to train orders, and also in rules 210 and 211 for the person who shall authorize the "complete." Opinion is very much divided as to how these blanks should be filled, it being optional with the road adopting the rules. On different roads orders are signed by the superintendent, assistant superintendent, train master or chief dispatcher, and there is at least one large system on which orders are signed by the dispatcher himself. This last, it would seem, is not without reason, as the man who issues the order is the sole authority in the movement of trains, as are the train master, road master and master mechanic in their respective departments.

On many roads the "O K" to the order (a provision which is omitted in the last revision of the Standard Code) and the "complete"

are signed by the dispatcher and his initials appear on the order, but on other lines there is nothing to indicate by whom it was issued.

The Standard Code provides for only the conductor to sign for orders. A few years ago the custom was quite general for the engineer, also, to sign for them. While the latter seems to be the correct principle, inasmuch as he is equally responsible with the conductor, yet when the engineer is required to leave his engine and go to the telegraph office much valuable time is lost. For this reason, on the majority of roads today, only the conductor signs, he being responsible for delivery to the engineer.

There are two forms of train orders, the "31" and the "19" form. (For blank forms, see page 191.) The figures are those used on the wire to distinguish the two forms. The difference is that the "31" requires the signature of the conductor and the "19" does not. The blanks are usually printed on different colored papers so as to be easily distinguishable. Although the Standard Code does not define the circumstances under which each form is to be used, it is generally ruled that the "31" form must always be used when the rights of a train are to be restricted, while the "19" may be used in conferring additional rights. The same order may be sent to the superior train on the "31" form and to the inferior on the "19" form. This is generally

considered the only safe way of handling trains, especially on single track. I have heard, however, of places where the "19" order is used for the superior train by first addressing the order to the operator at the station where the train is to be restricted, he using his train order signal as an additional safeguard. For instance, on a road extending from A to D, it is desired to make Nos. 1 and 2 meet at C. No. 2 is the train of superior direction and is running from A to D. The order is put out as follows:

To Operator, C
C. & E. No. 2, B
C. & E. No. 1, D
No. 2 will meet No. 1 at C.

The operator at C repeats the order and holds his train order signal against No. 2, after which the order is completed to each of the trains on the "19" form, no signature being required from the conductors, and possibly neither train is stopped.

I consider that the "19" order, wherever it can be used with safety, is a valuable addition to any code, as the time lost in signing and delivering orders, especially where a train is stopped for that purpose, amounts to considerable. On some double track roads, especially those fully protected by block signals, it is the only form in use.

Several devices are in use for the delivery of "19" orders at high speed, and have proved

quite successful. A simple device in the shape of a hoop has been used quite successfully for this purpose, the engineer and conductor each catching one on his arm. By this means orders can often be delivered without the slightest delay.

The "19" form has met with considerable opposition by some who think it is not entirely safe, and there are yet some roads where it is not in use. On some it is used sparingly, being permitted only for moving trains in the same direction. It is, however, constantly growing in favor, and its universal use within a few years seems assured.

Forms of Train Orders.

We shall now consider the different forms of train orders, which will be found printed in full commencing on page 191.

FORM A. This form is self-explanatory. The superior train, whether by right, class or direction (see definitions, page 129), holds the main track, the other train taking the siding. (See comments on Form C, page 39.)

FORM B. We consider that the most valuable application of this form is example 2. There are times when it is impossible for the dispatcher to tell where it will be best for one train to pass another, and this form authorizes the following train to pass the leading one whenever practicable. This form is not to be

used for trains of the same class, as they already have that right, but it is valuable in the case of trains of the same character or importance, though of different classes.

There is another situation which frequently arises and is not covered by any example under this form, although the principle is the same as that which is covered by example 2. It is where it is desirable to keep an inferior train moving ahead of a superior until it shall be overtaken. This frequently happens in the case of a local freight (usually termed 3d class), or an extra running ahead of a 2d class train. The trains may be of practically the same importance, the only object being that one shall not delay the other. This is accomplished on some roads by a form like this:

Extra 256 will run ahead of No. 62 until overtaken.

One code uses the word "will" for a positive order for one train to run ahead of another and the word "may" for an order authorizing the inferior train to run ahead as far as practicable. The two forms are as follows:

Extra 256 will run ahead of No. 62 A to J.

Extra 256 may run ahead of No. 62 A to J.

Under the first example No. 62 has no right to pass extra 256, but under the second both trains have equal rights and either may precede the other.

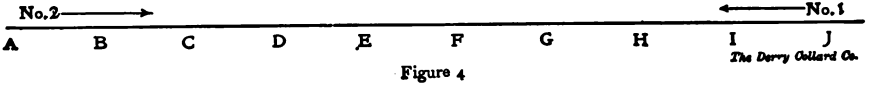

Figure 4

Diagram showing road on which train rights have been reversed by an order of form C.

The last paragraph of the explanations under this form require that with a "run ahead" order the superior train must not exceed the prescribed speed of the inferior train while the latter train is ahead. This provision should always be considered in issuing orders of this kind.

FORM C has the effect of reversing the rights of the trains named, with all that is implied therein. The train thus given right over another becomes in all points superior to it, just as though the superiority were conferred by time table, and this superiority continues until the order is fulfilled, superseded or annulled. To make a practical application of this form let us imagine a road on which No. 2 runs from A to J and No. 1 from J to A, both trains being of the same class, No. 2 of the superior direction. (Fig. 4.). The trains are due to meet at H. No. 1 is given right over No. 2 H to D. This makes No. 1 the train of superior direction between the points named. If No. 2 has time to make any station from E to H inclusive, and clear the time of No. 1, it may do so. Should the trains meet at any of these points, No. 1 will hold the main track. If No. 1 should not meet No. 2 before arriving at D, it would take the siding at D, the order then being fulfilled.

While No. 1, under this order, is the superior train, any restrictions may be placed upon it for the benefit of No. 2. It may be

given an order to "wait" at a certain point, (Form E), or an order to "run late," or an order may be issued for the trains to meet. Any of these orders may be superseded or annulled, but the "right" order remains in effect until it is fulfilled, superseded or annulled.

Under example 2, on our imaginary road, if extra 286 were given right over No. 2, H to D, No. 2 could not, in the absence of other orders, leave D until the extra arrived, as the latter train has no schedule time. But, as in the former supposed case, the extra may be given orders to meet or to "wait" for No. 1, and the extra is in every sense the superior train between the points named in the "right" order. In the case of a "wait" order, No. 1 would be required to clear the designated time as many minutes as the extra was before required to clear the time of No. 1. In the majority of cases where this order is used the trains do not meet before the order is fulfilled, but when they do, the train which was originally superior is required by the fourth paragraph of the explanation to stop the other train and notify the conductor and engineman of its identity. Presumably it was thought that this would be a rare occurrence and this provision was made to insure an understanding between the two trains.

The order is often used when the inferior train is on time and the superior is very late, allowing the latter to make where it can for the former.

FORM D involves the same principle as Form C with the difference that this form includes trains in both directions, while Form C is prescribed for opposing trains only. Like the third example under Form C, this form is seldom used except in cases of emergency.

FORM E. This is an important form and is much used. Example 1 makes the figures on the time table as much later as the order calls for, and other trains can be governed accordingly. It must be remembered that an order to "run late" between certain points affects every time table figure on the schedule between those points, but *no more*. This applies to arriving time, leaving time, and minimum running time, if such be used. (See Section on "Times at Stations.") For the purpose of illustration, we produce a supposed schedule of No. 1:

Leave	A	8:10 a. m.
	B	8:23
	C	8:30
Arrive	D	8:42
Leave	D	8:55
	E	9:10
Arrive	F	9:25 a. m.

An order is issued,

No. 1 will run 20 minutes late A to D.

This would make the figures 20 minutes later from A to the arriving at D, inclusive. If the order were, "No. 1 will run 20 minutes late A to E," it would be fulfilled when the train has

left D 20 minutes late, as there is no arriving time at E and it may be considered due at that station immediately after it is due to leave D. It would therefore be due to leave E on time.

Under the third example of this form let us refer to our imaginary schedule and suppose that an order is issued as follows:

No. 1 will wait at C until 10 a. m. for extra 25 east.

Until a short time ago I never heard of more than one interpretation of this form, and I still believe that this interpretation is well nigh universally accepted. The common understanding is that, with the order quoted, extra 25 can use until 10 a. m. (or 9:55, using a five minute clearance) to make C or any station before reaching C; or, in other words, that an order to wait at C means that the train will also wait until the specified time at all succeeding stations and that opposing trains may be governed accordingly. I understand, however, that the officers of a large system have ruled that, on their line (using the example before us) No. 1 is required to wait only at C until 10 a. m., is considered due to leave D and all other stations on time, and extra 25 would be governed by this understanding. The claim is that the explanation to this example requires the train to wait only at the designated point and that the order does not restrict the movement of the train at

any other point. Let us see about this.

While a strict regard for the wording of the rule may warrant this interpretation, the general understanding seems to be the most efficient method of using the form. For the reason that a time at one station will often accomplish the result which would necessitate a time at every station if the other interpretation were accepted.

FORM F. Several examples are given under this form, the intention being to provide a form to suit varying conditions. Sometimes it is not known, when the signal order is issued, what engine will be on the following section. In such a case the first example may be used. This example would also apply in the case of engine 20 running as the first section of a train for which there is a regular assignment of engine and equipment; a regular passenger train, for instance.

The second example is usually used in the case of a regular train with assigned engine and equipment. It means practically the same as the fourth and fifth examples.

Where all the engines are known and the sections are to run over the entire division or district the fourth example can be used, and if they are to run over only a part of it the fifth would apply.

It will be seen upon examination that the several variations of Form F are not explicit in every detail. They prescribe the words to

be used and that is all. They do not say to whom the orders shall be addressed or how the different sections shall be governed after the orders have been fulfilled. It is not intended that the Standard Code shall be too binding. Conditions vary in different parts of the country and on different roads, and it is left to the lines upon which the Code is adopted to make such rulings upon certain matters of detail as best suit their requirements.

It is generally accepted that one section of a train may start from its terminal on any district or division and fill the schedule without a train order. For all other trains or for a train starting from any point other than the initial station, as shown by the time table, an order is necessary.

Under the first and second examples, if the regular train—that is, the regularly assigned crew or equipment—displays signals or has signals displayed for it over a part of the division only, it may continue to its terminal without further orders. This is a ruling made by the American Railway Association.

Under the fifth example, if Dover is not the terminal station, I think the general understanding is that the order is fulfilled on arrival at that point, and none of the sections can proceed without further orders.

For an understanding of such points as are not fully explained in the Standard Code and

upon which we have no ruling from the American Railway Association, we must look to the officers of the individual road. This applies not only to Form F, but to many rules in the Code.

The example, "For Annulling a Section," is referred to in treatment of Form K.

FORM G. The third example under this form provides for an extra with right over certain trains. It may be given right over all trains or only one train. With respect to trains over which it is not given right it is the same as any other extra. This form is used largely for passenger and other important trains when it is impossible to run them on a time table schedule.

Where it is desirable to give an extra right over only one train it is often done in this manner:

Engine 262 will run extra A to G and has right over No. 1.

To this may be added if desired, "and will wait at C until 10 a. m. for No. 1," or the "wait" can be put in another order. In this case, like all others where one train is given right over another, the extra holds the main track should they meet at any point before the order is fulfilled.

FORM H. This form, together with the methods of handling work extras, is treated in another section.

FORM J. This form is seldom used in ordi-

nary work. Its chief value is in case, for instance, of an anticipated delay at a station, when it is necessary for the conductor to leave the telegraph office, the train having passed the train order signal. The operator can, by obtaining the conductor's signature, receive orders for the train, having the assurance that it is held. It is also used in case of accident, when it is desired to hold all trains at a designated point.

FORM K. Although this form is entitled "Annulling a Regular Train," I think the meaning would be better expressed and there would be less confusion in the minds of some if it were "annulling a Schedule." This is really what it does. It has the effect of taking that *schedule* off the time table on the date mentioned.

This form has been used for annulling a section, but I believe it is entirely wrong, as there is an example under Form F for this purpose.

When a section is annulled, one train is deprived of the use of the schedule on which it has been running, while one or more other trains continue to use it. The circumstances under which Form F is to be used appear to be entirely different from those which call for the use of Form K. Yet I have frequently seen orders in these words:

> 3d No. 61 of February 23d is annulled H to Z.

This answers very well and no questions are asked if no subsequent changes take place, but let us suppose that it is desired to run a 3d section of No. 61 from M to Z. Can it be done? Suppose, after 3d 61 signs the order at H, the arrangements are changed and it is desired to run it through to Z instead of stopping it at H. Or, suppose we wish to run some other engine and crew as 3d 61 from H to Z. The explanation to Form K, the one under which that section was annulled, reads, "The train annulled loses both right and class between the stations," yet we know of no reason why, as long as a *schedule* is in existence, we cannot run as many sections as may be desired, and between any points.

It should be thoroughly understood that Form K is to be used when a schedule is to be taken off the time table, and Form F when a section is to be taken off a schedule.

FORMS L, M, and P explain themselves, and no comment is necessary.

Extras.

The manner of handling extra trains, or of handling what is usually termed "dead freight," has been the subject of considerable attention.

It was formerly the practice, and doubtless is yet on some roads, to have a number of freight schedules on the time table, and handle all freight traffic in this way, running as many

sections as may be required. This practice is being replaced very largely by that of having only important freight, usually termed "time" or "manifest" freight, represented on the time table, all other freights, except locals, being run as extras. Where a number of extras are on the road at one time the liability to error and oversight is always present, and to avoid this, numerous methods have been advocated and tried, with varying degrees of success.

The plan of running extras in one direction only is practiced on some lines. In the other direction trains are run on the time table schedules, so that there will be no meeting points between extras. This is not always successful and usually makes a great deal of work for the dispatcher. If there are few schedules on the time table he must look a long distance ahead to provide signals for trains which possibly never run. If there are several schedules it is unlikely that they fit the traffic and the trains that use them are several hours late, sometimes "dying" on the road. If there is no train to fill the schedule other trains must be helped against it or it must be annulled.

Several plans have been worked out whereby an extra in one direction is inferior to all extras in the other direction, and cannot move from any point until it has help against the next extra. The plan includes a system of consecutive numbering for those in the superior direction, so that an inferior extra

can, at all times, tell which extra he should meet next. The proposed numbering of superior extras begins with No. 1 for the first extra leaving the initial station after midnight and closing with the last one before midnight.

While it is true that the promiscuous running of extras is open to some objections, owing to the ever-present element of human fallibility, there is no plan in general use as a substitute.

I believe the practice of issuing running orders over only a part of the division at one time is the most advantageous and has a tendency to simplify such movements. On almost every dispatcher's district there is a natural dividing point, or possibly more than one, and orders are issued, by custom if not by rule, only between such important points. Thus, an extra from A to K would receive an order to run from A to D, and another at D to run from that point to K. This makes a comparatively short territory over which orders for extras in opposite directions are issued.

I consider it to be of great advantage to allow extras to run ahead of certain classes of trains without orders. Extras are always of at least equal importance to local freights and in many cases are the same character as trains running on a second class schedule. Where the rules do not permit of equal rights in the same direction, the dispatcher invariably issues

orders to that effect, often stopping the superior class train to give the order.

The third example under Form G is useful in many cases, either in the form referred to or abridged so as to apply to certain conditions. It is used for passenger trains or for important freights which it is desired to make superior to certain other trains. The Standard Code form implies that a time is to be inserted at each station. When this is done it makes a long order, much time is required in sending and repeating, and it is often entirely unnecessary. Many times the same purpose can be accomplished by giving a time at only two or three stations. An abbreviated form is as follows:

> Engine 77 will run extra Turin to Rome and has right over No. 81 and will wait at Turin until 11:30 p. m. and at Pekin until 12:25 a. m. for No. 81.

The "schedule extra," or "special," as it is sometimes called, is a good thing when enough trains are concerned to warrant using a time at every station or a number of stations, but in many cases the train can be moved as well with much less work and not nearly so many orders to handle.

Work Trains.

There is a great diversity, on different roads, in the methods of handling work trains. This is due not only to the ideas of the men who form the rules but to local conditions, and also to the relative importance of the trains concerned.

Printed rules in regard to work trains are few. The Standard Code contains only Form H for single track and D-Form H for double track, authorizing the forms of train orders, and the few words of Rules 97 and D-97. In various codes, however, other rules appear with reference to their government.

The Standard Code form provides for the time limit to be fixed in the order, but on some roads the book of rules establishes the limit, which is usually from 6 a. m. to 7 p. m., and work orders are in effect only between those hours, unless the order specifies others. In giving an order under a rule of this kind it is necessary to give the date on which it is to be used and is in the following form:

Engine 292 will work extra Saturday, May 2d, between Berne and Turin.

If it is desired to work at a time other than that specified by rule, the order reads:

Engine 292 will work extra until 9 p, m., Saturday, May 2d, between Berne and Turin.

Another provision, which is of considerable value, is found in some rules and requires the conductor of a work train, when he is done using his working orders, to send a message to the effect that he is "tied up," and this "tie-up" annuls his working order. This very often facilitates the work of the dispatcher.

There are a number of methods for handling a work train with respect to its relationship to freight trains passing over the road. Of course the desired end is to give the work train the use of the track until the expected train is to pass over the portion so occupied, the work train to immediately clear the main track, but this is extremely difficult to perfectly accomplish unless the freight train is on a schedule and on time. For extra trains and for regular trains which are late, we know of no way whereby, generally speaking, this can be accomplished without some delay to either train, for the reason that there is no dispatcher who can correctly guess, an hour or two in advance, what time a train will be at any particular point.

The nearest approach to its accomplishment

is by the use of examples (b) and (e) under Form H whereby the work train is permitted to work under protection of a flagman until the expected train arrives, but even then there is often delay to the freight train, especially if the work extra must run toward the approaching train in order to get in on the siding. On the other hand, where the work train must clear the main track at a certain time, whether the expected train is there or not, a serious delay often results to the former.

There are various practices. If the freight train is very important and it is desired that it run over the working limits without any delay whatever, it is given (in the case of a regular train) either a "run late" order or a "wait" at a certain station until a certain time for the work extra. In the case of an extra this can be accomplished by the use of example 1 (b) using the words "keep clear of." This almost invariably incurs delay to the work train and should not be used unless the freight train is of great importance. As a rule the loss of time to the work train is more expensive than a corresponding loss to a passing freight train and for that reason the Standard Code provides for a work train to work under protection of a flagman until the expected train approaches. The prescribed forms are found under example 1 (b), (d), and (e).

I know of at least one road where the rules permit a work extra to protect against second

and third class trains, and I think it is a good rule. It relieves the dispatcher from sending a great many long train orders, and in my experience I have seen but very few freight trains of so great importance that this rule could not be used to great advantage. Of course, it must be understood that the work train must get out of the way immediately on the approach of the other train, and if necessary it can be instructed by message about when to expect an important train and practically no delay will result. On many roads where this rule is not in effect it is the custom to insert in the order a provision to protect against second and third class trains, which accomplishes the same result, but with considerably more work for the dispatcher.

In reviewing the rules of another large system I find the following under this form:

"When an order has been issued to 'work' betwen designated points, no other extra shall be authorized to run over that part of the track without a definite meeting order with the work extra.

"When it is anticipated that a work extra may be where it cannot be reached for orders it may be directed to report for orders at a given time and place, and a meeting issued with other extra.

"To enable a work extra to work upon the time of a regular train, the following form may be used:

"'No. 55 will wait at Berne until 6 p. m. for work extra 292.'"

There is no provision in the rules of this road for a work train to protect itself against another train. The work train must have a "meet" order with other extras, and the only means whereby it can work on the time of a regular train is by the use of the "wait" or "meet" order.

Another method, which can be used where the limit is very short or the work train is in full view of approaching trains in either direction, is to give the work extra right over all except first class trains. This relieves it from protection by flagman and trains approach the limits prepared to stop, when the work train immediately gets out of the way. Should the work train not be there the train can "flag" through the limits, as of course they are favorable for so doing. This plan is worked successfully on some roads, though there may be some officers who would object to it.

There are different methods of interpreting the "right" order in the case of a work extra having right of track over other trains. Suppose the following order is issued:

"Engine 292 will work extra until 7 p. m., between Berne and Turin, and has right over extra 296 east."

We will suppose Berne and Turin are one mile apart. I know one road where extra 296 would not enter the limits until 7 p. m.,

even if it saw the work extra on the siding. It would consider that the latter train had absolute right to the track until its order expired. On another, extra 296 would proceed if it saw the work train clear of the main track, but not otherwise. On another road the extra would waste no time if the work train was not in sight, but would flag through the limits. I like the enterprise of the last mentioned road, and believe that train movements can be facilitated very greatly in many cases by a little effort and the use of a red flag.

There are a few roads that require the working order to be addressed to all trains (or to all except first class trains) and placed at either end of the working limits so that such trains may be advised of the presence of the work train. This does not, however, confer any additional rights on the work extra, but only serves to notify approaching trains.

Provisions in the Standard Code being so few, it is but natural that certain questions should arise in the handling of work extras, and we find a number of rules from different roads which answer some of these questions.

On a large Western system where the time limit is fixed by rule from 6 a. m. to 7 p. m., we find the following:

> A train receiving an order to protect against a work train extra and not reaching the limits mentioned in the order before 7 p. m., must not assume that the

work train extra is laid up or clear of the main track; but must protect against it unless such order is superseded or annulled.

This is on the general question of whether all orders concerning a work train are annulled at the time the working orders expire, either by the time in the order or by rule. This is the only rule I know of which has any bearing on the subject, and it will be noticed that this directs the train to continue to protect—a provision on the side of safety.

Orders have been issued directing a train to meet a work train at a certain point and have not been executed when the working order expired, and the question has been asked whether the train should continue to wait for the work extra. A work extra has had orders to protect against an extra or regular train which did not arrive until the working order has expired, when a new working order was issued. Shall the work train continue to protect against the extra or *may* it continue to protect against the regular train? These are questions which we cannot answer by rule, and all I can say is to *take the safe side,* as indicated by the rule I have quoted. The dispatcher, in putting out orders of this kind, should include such provisions as will insure safety.

I quote another rule which I presume is the result of certain questions which have been raised.

If a subsequent order to go to other parts of the road be received, the original order expires and must not be used again.

In case orders should be given to a point outside of the working limits for water, fuel, or any other cause, and it be desired that the "working order" should not be cancelled, the subsequent order should state that the working order (giving proper number and reference) will remain valid.

The question has been asked if a work train should register every time it comes to a registering station, and this is a general requirement. If its limits, for instance, are on both sides of a registering station, and this rule is adhered to, it will show at all times on which side the work extra is. Should an extra be started from such registering point this information would, of course, be essential.

I have seen, in the case of a work train which occupies the same limits for several days or weeks, what might be termed a "permanent" or "standing" work order. It is put out to all trains, or to certain trains, on each side of the limits, and is something after this manner:

To all trains east except first class,

A.

To all trains west except first class,

C.

Between 6 a. m. and 6 p. m. daily, except Sunday, engine 292 will work extra

between Berne and Turin and will protect against all except first class trains.

This may be varied, of course, by making the working limits between certain mile posts or defining them in some more specific way, also in the provisions regarding other trains. When the limits are short the work train can be given right over all but first class trains, which will relieve it of flagging, but other trains will be required to flag through the limits.

The question has been asked as to the proper way to extend the time limit or the working limit after the original order has been issued. We do not know of any authorized form either in the Standard or any other code. I have seen orders given in this form:

To C. and E. Eng. 292.

Your limits are extended to 9 p. m.

It is preferable, however, to send a new order, as it is according to the authorized form and gives less occasion for question.

With an order reading, "Eng. 292 will work extra until 7 p. m. between Berne and Turin," it has been asked if the work train can use the main track at both the stations named. For instance, supposing Berne to be the western limit and Turin the eastern, has the work train a right to the main line up to the west switch at Berne or to the east switch at Turin? Whatever may be the correct answer or whatever the general understanding, I know

of one superintendent who requires that work orders shall specify definitely what point on the main line is the working limit. Orders on this line are therefore put out in the following form:

Eng. 292 will work until 7 p. m. between east switch Berne and west switch Turin.

The idea is to fix definitely in the order the exact place, and it appears to possess some merit, yet I think an understanding could be had as to what is meant if only the names of the stations are used, thereby saving time and words in many cases.

For double track work the Standard Code provides that an order to work extra between certain points must be accompanied by one of four additions which are prescribed under D-Form H. The first two indicate on which track or tracks the train is to work and whether or not it is to protect against extra trains, the rule being that it shall protect against extras moving in the current of traffic unless relieved from so doing by the working order. The third addition gives it the right to work on the time of specified regular trains by protecting itself, and the fourth requires it to protect against trains which may be moving against the current of traffic.

On double track, generally speaking, the simple work order is used, and that is understood to give the train a right to use the main

tracks *only in the proper direction* between the points named. So far as each track is concerned, therefore, it is an extra, and governed by the same rules as an extra passing over the division, and if it stops on the main track is required to protect against all following trains, as per Rule 99, which of course includes extras. The only advantage in a work order is that the train may run back and forth between the stations named (always on the proper track), or may use an intermediate cross-over if necessary. It confers no right to run in the wrong direction unless the order so specifies.

Change of Time Table.

Rule 4 of the Standard Code, which governs the action of regular trains in changing to a new time table, has been the source of more debate than all other rules combined. It has proven an exceedingly difficult matter to formulate a rule which will provide definitely and beyond question for all trains and schedules which may be concerned when a change takes place, and at the same time involve the least amount of work necessary to safety.

The method which seems to be proof against argument is the first of the two optional forms, Rule 4 (a). Under this rule, when a new time table takes effect, all trains on the road or due to be on the road are annulled and no train is then due until it is

due to leave its initial point after the time table takes effect.

This necessitates running all trains on the road as extras from the time they are overtaken by the new time table, and on a busy division this is an undesirable feature. Wire trouble at this time might be the means of causing serious delay.

Rule 4 (B), whereby a train on the road assumes the schedule of the corresponding number on the new time table is almost universally used, and, with proper care, I believe it to be the best. In nearly every case it will answer the purpose with little, if any, extra labor, and if there are situations wherein a question may arise they can be anticipated and proper provision be made so that there need be no misunderstanding.

It is not claimed that the rule is perfect, or that it provides definitely for every possible situation. The following question was once presented to the train rules committee of the American Railway Association.

> Train No. 1 under the old time table leaves B at 10 a. m. The new time table takes effect at 10 a. m. June 1st. On the new time table No. 1 leaves B at 9 a. m. and C at 10 a. m. Does the new time table provide for No. 1 between B and C on June 1st, or is the train annulled? If annulled, is it annulled only between B and C, or is it annulled from B to the end of

the division? If not annulled, should No. 1 consider itself one hour late at B and govern itself accordingly?

That committee replied in the following words:

> In such an instance, the plain duty of the superintendent is . . . to issue special instructions to provide for such a contingency, as it can only affect the train for one day.

This reply, coming from the Association which formed the rule gives us to understand that the rule only establishes a principle, that of a train on the road assuming the schedule of the corresponding number of the new time table, and that whatever details may not be clearly provided for must be arranged by the proper officer. As has been said, in nearly every case this rule can be applied without special instructions, and all things considered, it is the best.

Several attempts have been made to modify the rule, with varying degrees of success. They have provided for some questions which have been raised, and thus added to its value. One of the best modifications is probably in the code as adopted by the Canadian Pacific:

> Each time table, from the moment it takes effect, supersedes the preceding time table. A train of the preceding time table must retain its train orders and take the schedule of the train of the same number on the new time table, to start from its

initial point on that section or branch within twelve hours from the moment the new time table takes effect, in which case the train of the preceding time table takes effect and can thereafter proceed only by train order.

This is to provide for the case of a train on the road finding that its corresponding number is due to leave the initial point after the time table takes effect. The question has been, cannot a train leave the terminal on the schedule in question on the new time table? The train on the road, having the right to assume the schedule, is it not possible for two trains to run on the same schedule the same day? Hence, the provision we have mentioned.

Quite as universal as Rule 4 (B) is its second paragraph, which provides that a new train, or one which has no corresponding number on the old time table, shall not run until it is due to leave its initial point after the time table takes effect. One exception to this rule which was provided for in the following paragraph in place of the one referred to:

All new trains created by a new time table will be considered as on the road, at and from the time their schedules take effect.

This made the new time table, as soon as it was in effect, just the same as though it

had been in effect an indefinite time, and all trains shown were due unless they were twelve hours late. This rule has some advantages, but it is also open to objections, and is not widely used. Rule 4 (B) seems to be more in favor than any other.

Train Order Signals.

In the operation of trains by telegraph the station train order signal plays a very important part. It constitutes a fixed signal at every station where train orders are handled, and the position of the signal, in conjunction with certain rules governing its use, either holds the train or allows it to proceed.

There are several forms of train order signals. Figure 5 shows different forms of the well known target signal. It may be painted either green or red, though I believe it is now the universal custom to show red for all signals of this style. The signal is shown in the "danger" or "stop" position. When it is "clear" the target is turned parallel with the track and is not visible to approaching trains. The night indications are usually red for "stop" and green or white for "proceed."

These signals are usually attached to the side of the station building, often under wide spreading eaves, and are not plainly seen from a long distance by approaching trains. The great number of fast trains of the present day make it necessary that signals of all kinds shall

be of a form and in a position that can be easily seen and distinguished, so that a train not otherwise required to stop shall lose no time if the signal be clear, but shall have time to stop *at* the signal if it be at "danger."

This has led to the introduction of the semaphore on many lines, which is generally considered the best form of signal for train orders as well as general signaling.

Semaphore signals are of various forms, the two most common being shown in Figs. 6 and 7. The difference in these two is the angle to which the arm is dropped while in the "clear" position. One is oblique and the other nearly, if not quite, vertical. In all semaphores the horizontal position indicates "stop."

When a semaphore is used for trains in one direction only, the indication is taken from the arm pointing to the right of the post as seen from the approaching train. The arm to the left has no significance. (Fig. 8.) Where but one arm is used for a train order signal it is to govern trains in both directions. A single arm is often used on single track but it cannot be used on double track. (Fig. 9.) On single track the double arm is generally used, one for trains in each direction.

For a train order signal only two indications are required, but on many roads the block system is in effect and a third position is desirable to indicate "caution" when used for blocking. The signal can be, and in many

cases is, used for both train orders and block work, but only the two positions, "stop" and "proceed" come under the rules governing the train order signal.

There are two forms of signals which are capable of three positions. These are shown in Figs. 10 and 11. In Fig. 10 the upward inclination of the arm indicates "caution" and in Fig. 11 this is indicated by the downward inclination. In the latter it cannot be confused with "clear" for that requires the arm to be in the vertical position.

Semaphores, when used for train order signals, are usually red, though on a few lines they are yellow. Until a few years ago the standard colors for night were red for "stop," white for "proceed" and (when necessary) green for "caution." Of late years, however, there has been a growing sentiment in favor of green for "proceed" and this color is now used on a number of roads, it being considered better than white for several reasons. This led to the question of a suitable color for "caution," and orange or yellow seem to be most in favor, while one or two roads use a combined green and red light. The reader should bear in mind that for train order work there are but two indications, "stop" and "proceed."

The Lake Shore and Michigan Southern uses a signal which is peculiar to that system. It is unique in that it can be used for block-

ing or for train orders, and on either single or double track. It is called the "Right-Angle Semaphore," and revolves about its axis so as to make a number of indications. A lamp is suspended in the pole, which is hollow, and is raised and lowered as the signal revolves. By means of colored glass inserted where the lamp stops, any night signal can be shown to correspond to any position of the arms. For a train order signal on single track the position shown in Fig. 12 indicates "stop" and that in Fig. 13 indicates "proceed." The other indications are used on double track for block signaling, or for any special indications which may be desired.

The Standard Code authorizes two forms of Rule 221, either of which can be adopted by the individual road. The first provides that the normal position of the signal be "stop," except when changed to "proceed" to allow a train to pass. Under the second form the signal stands in the "proceed" position except when orders are held for a train, when the signal must indicate "stop." Opinion is about equally divided as to the merits of each, though it is my opinion that a majority of roads use the second form, in which the normal position is "clear."

Each method has its advantages and its disadvantages. From the standpoint of the dispatcher the first form is preferable as there is no chance for a train to pass a station without

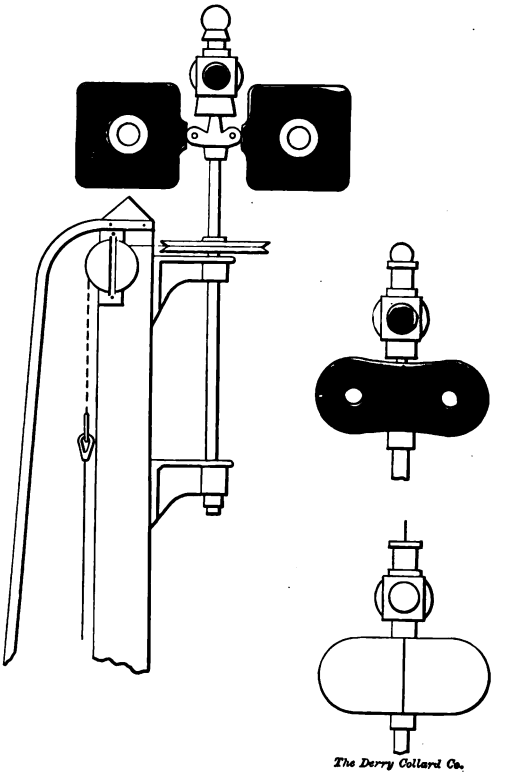

FIG. 5—Target signals.

FIGS. 6 AND 7—Two common forms of semaphores.

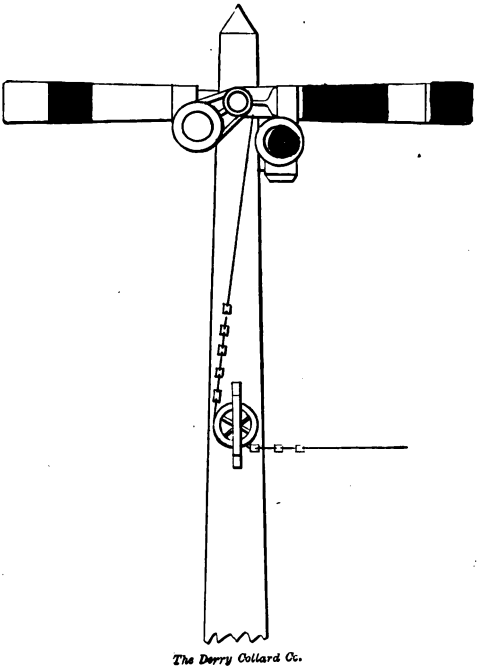

FIG. 8—Two position train order signal.

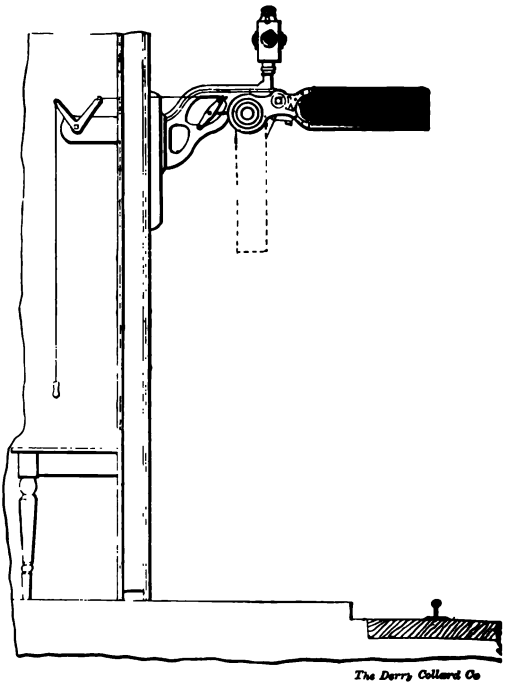

FIG. 9—Train order signal.

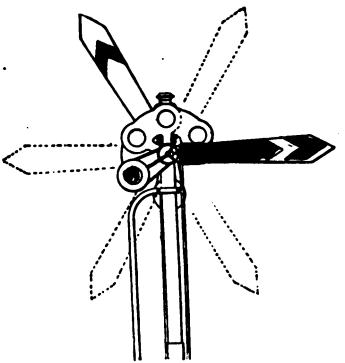

FIG. 10—Three position signal.
Horizontal, stop; up, caution; down, proceed.

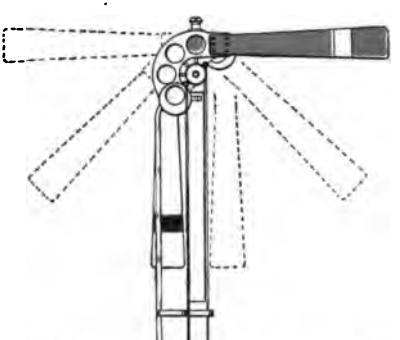

FIG. 11.—Another three position signal.—Horizontal, stop; inclined, caution; down, proceed.

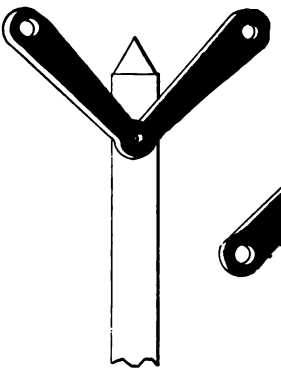

Figure 12

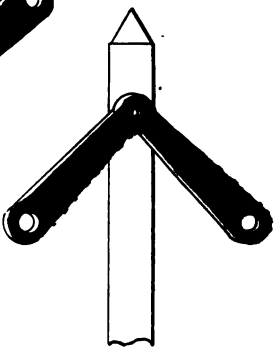

Figure 13

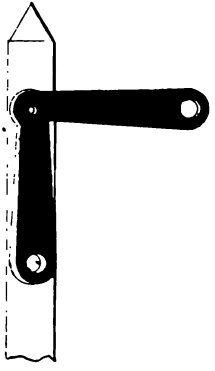

Figure 14

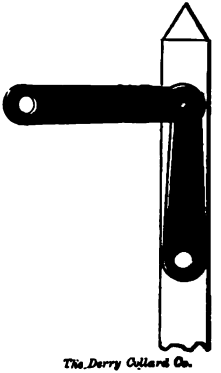

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Figure 15

Right-angle semaphore for block signals on double track or train order signal on single track.

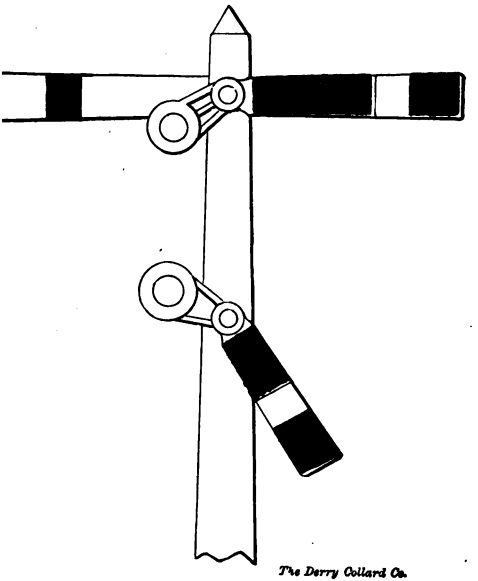
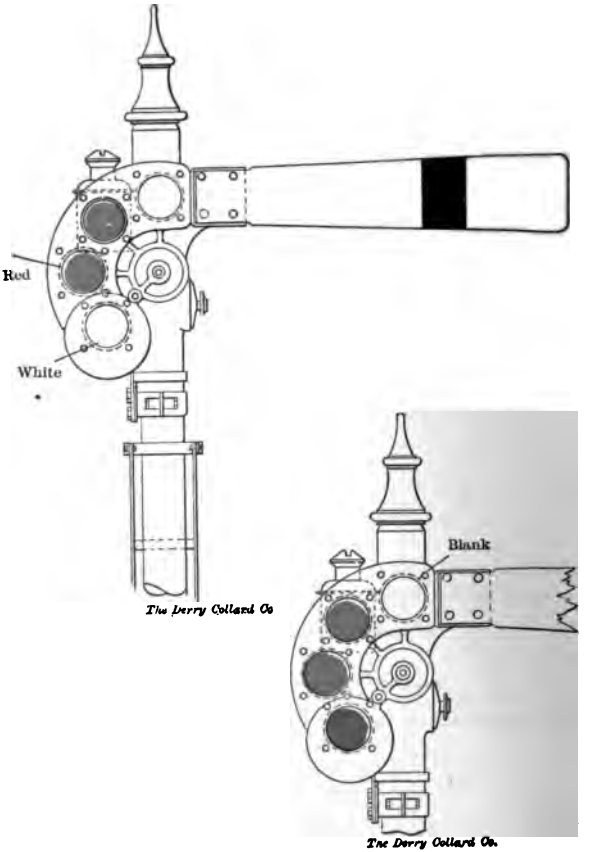
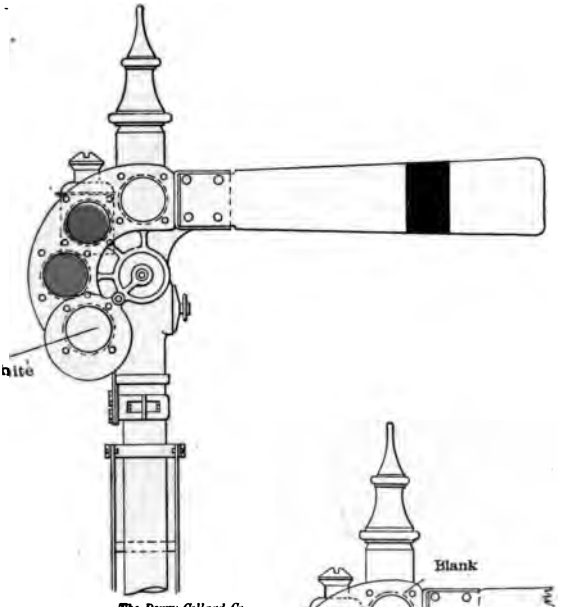


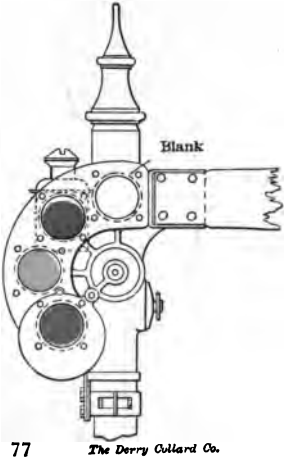
Figure 16

FIG. 16—Double arm semaphore for single track—small arm for train order signal.



FIGS. 17 AND 18—Standard semaphore arm.





FIGS. 19 AND 20—
Standard
semaphore arm.

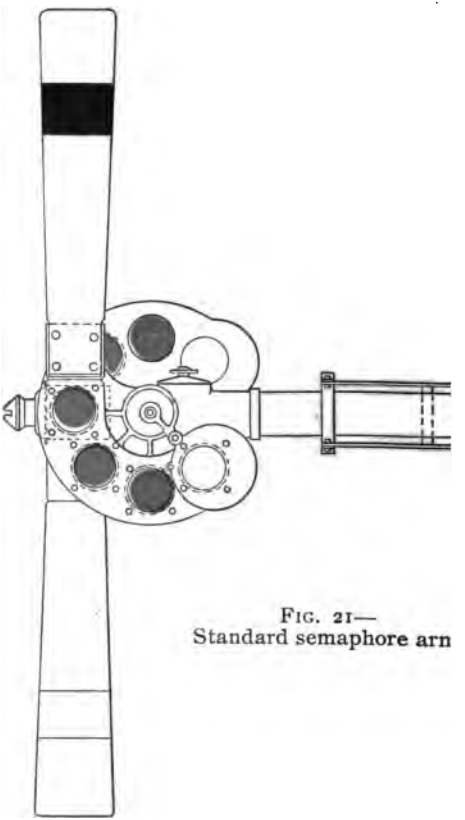


FIG. 21—
Standard semaphore arm

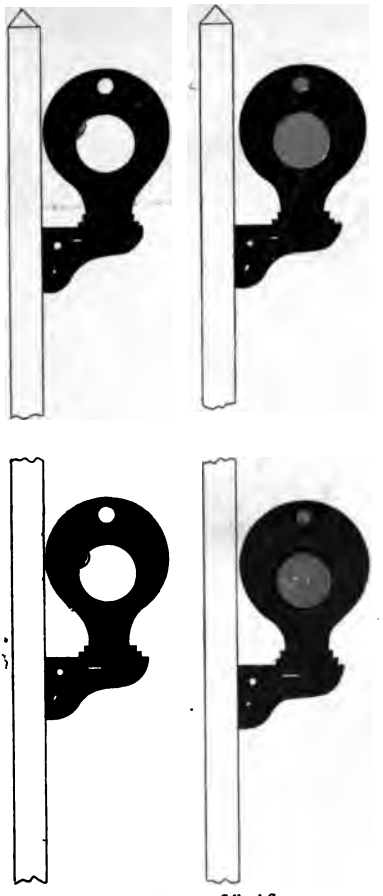


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FIG. 23—Disc type semaphore.

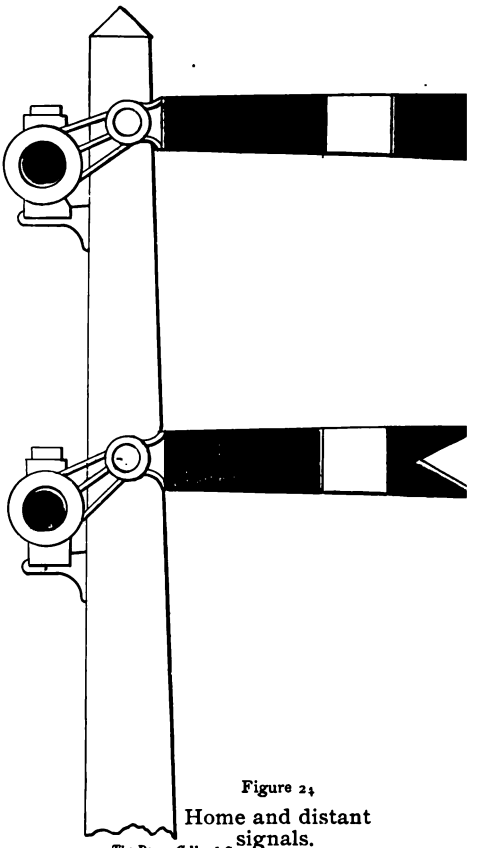

Figure 24
Home and distant signals.

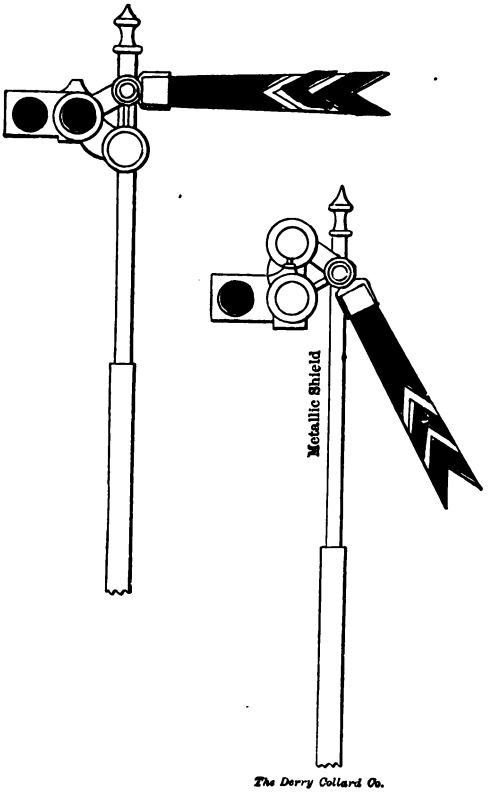

FIG. 25—Green light for "clear."

the operator's knowledge (providing no rules are violated), while with the second he is sometimes in doubt, especially during the hours of the night, as to the statement of an operator that a certain train has not passed.

On the other hand, I have heard complaints from enginemen that for a fast train there is a slight loss of time at each signal when working under the first method, as the rules usually require that the signal be changed from "stop" to "proceed" in the sight of the engineer and in response to his station whistle. If this is not done promptly he is not prepared to stop *at* the signal, for he expects to see it change, and if it should not, the train usually runs by some distance.

The chief advantages of this method may be summed up in the fact that the engineer, being required to see the signal changed, knows the operator is on duty, and the dispatcher has more assurance, to say the least, that the operator knows what trains have or have not passed his station.

When an operator holds an order for delivery to a train, the signal which is holding that train must not be changed to "proceed" until the order has been delivered or annulled. I know of but one exception to this rule and that is on the Canadian Pacific. In the rules of that road there is a train order form which is used to authorize the operator to clear his signal long enough to allow another train

(specified in the order) to pass. It is in this form:

> Clear signal for extra 341 which left Dublin at 8:10 a. m.

Upon receipt of this order the operator can change his signal to "clear" to allow the specified train to pass, but must return to "stop" as soon as it has passed.

Questions have come up from time to time with regard to cases where (under the second form) the signal may show "stop" when the engine approaches the station, but is changed to "clear," also how a train should be governed if, while at a station, the signal should be changed to "stop" and again returned to "proceed." These questions seem to have been anticipated by those who formed the rules of the road just mentioned, in which we find the following addition to Rule 221:

> A train stopped by a train order signal must not proceed until a clearance is received.
>
> A train, the engine of which passes a train order signal indicating "stop," must not afterwards proceed without a clearance.
>
> A train which has stopped at a train order office, must not, although not stopped by the train order signal, afterwards proceed if the train order signal there then indicates "stop" unless it has a clearance.

From this it would seem that if the signal is

at any time in the "stop" position and is observed by the train, it must be regarded as though it remained in that position.

A former edition of the Standard Code authorized this understanding and the rule which appeared in that edition may yet be in use on some roads. The present rule simply defines the information indicated by each position of the signal and we may understand that the train is governed by the indication at the time it is ready to pass the signal, without regard to any former position.

On many single track lines the train order signal is also used for blocking trains. It is not the best practice as the conductor and engineer cannot tell, when stopped by the signal, whether it is for orders or for the block. If for the former the conductor is required to go to the telegraph office, and if the latter the train simply waits until the signal indicates "clear." In order that a separate indication may be made, there is, on some roads, a small semaphore which is used for a train order signal, and is located on the same post with and below the double arm semaphore used for block signaling. (Fig. 16.) The train order signal may not be so plainly visible from a distance, but when it is displayed the block signal can also be held in the "stop" position until both are observed by the approaching train.

THE UNIVERSAL SEMAPHORE.—The American Railway Engineering and Maintenance of Way Association has recommended a standard casting for semaphore arms which may be used for either two or three positions: horizontal and vertical for the former, and horizontal, inclined downward and vertical for the latter. It may also be used, by merely changing the glass in the spectacles, to indicate any desired color for any position at night. By placing the lamp on the top of the post, two arms (one for each direction) may be served by the same light. When only two indications are desired, horizontal and vertical, the color indicating "stop" may be inserted in the two upper spectacles so that this color will show until the arm has fully reached the "proceed" position, which prevents a false indication by night. (Figs. 17 to 21 inclusive.)

Train Registers.

Although the Standard Code is silent with regard to the register, it occupies an important place in single track work. The usual form is a book in which is recorded the date, the number of the train, engine, conductor, engineer and whether or not signals are carried and between what points. Some registers contain much more information than this, but the above named items are essential.

As a rule a register is placed at each station which is a terminal for any train, the place

being designated on the time table as well as instructions concerning what trains shall or shall not register.

The general rule is that all trains shall register their arrival and departure, but as its enforcement would cause a delay to some important trains, the rule is sometimes modified to suit the conditions in certain localities. For instance, at a freight terminal where passenger trains do not stop, the latter are usually allowed to register by "ticket"; that is, the conductor fills out a "ticket" or blank form containing the necessary information and throws it off in passing, and the operator or other person in charge enters the same on the register. If it is necessary for the train to know that others have arrived and departed the operator is required to fill out and hand to the conductor and engineer a slip or ticket giving this information.

I am informed that certain single track divisions of the Pennsylvania Railroad do not use a register, the operator giving the necessary information to trains as to the arrival and departure of those which are superior. Aside from this, so far as I know, a register is considered a necessity on single track.

The question has sometimes been raised as to whether work trains shall register every time they arrive at or leave a register station and we believe they are commonly required to do so, as the information is often of value,

in case, for instance, of the working limits extending on each side of the register station.

On some roads the register is used to give information as to trains that are annulled. Instead of copying train orders to that effect and delivering to each train concerned, the operator copies the order in a place provided for that purpose on the register. This seems entirely proper, as such information is in accord with the office of the register.

I know of at least one road where the engineer is relieved from checking the register, the operator being required to fill out a blank form for that purpose stating that all trains which are due have arrived and departed with the exceptions, if there are any. This is delivered to the engineer by the conductor and is, presumably, to save the time required for him to do so personally.

Those whose duty it may be to make entries on the register should bear in mind the importance of being absolutely correct, as the information thus shown is of equal importance to that of a train order.

Should a train start from a point where there is no register this information is given by train order and is usually in the following form, or with such modifications as are necessary to suit the occasion:

All trains due at ..... before .... m. (giving the time) have arrived and departed except .....

Clearance Cards.

In connection with the two sections immediately preceding, the use of the clearance card should be considered. Its use is by no means uniform on all roads, yet the principle remains the same, that of "clearing" a train and allowing it to proceed when it would otherwise be held. The Standard Code provides but one form of clearance, yet in different places it accomplishes different purposes, is called by different names and is printed in different forms.

The most common use of the clearance card is at terminal stations, and, generally speaking, no train is permitted to leave without a train order or a clearance showing that there are no orders for it. This rule is often extended to certain other stations designated on the time table, and on a few roads the rule applies to every open telegraph office except for passenger trains where they do not regularly stop. The terminal clearance is, on some lines, only issued on the authority of the dispatcher, but on almost every road the operator can deliver a clearance provided he has no order for the train.

In connection with the train order signal the clearance is used in various ways. On some roads a train stopped by the train order signal may proceed if it receives an order,

whether the signal is cleared or not. On others—and this is according to Standard Code Rule 221 (B)—a train cannot pass a train order signal in the "stop" position without a clearance. On still others a clearance must accompany the delivery of all orders, showing the number of each order. This constitutes a check on all orders and conductor and engineer must see that the clearance agrees with the orders they receive.

Where the block system is used there is sometimes issued a "caution card" in connection with the "permissive" block; that is, where a train is allowed to follow another into the block the "caution card" permits it to pass the block signal at danger. We quote from such a card in use on a prominent line:

To C. & E. of Train ———

Block is not clear. You may proceed with caution prepared to stop within your vision.

———————————

Signalman.

Reference has been made to the engineer's clearance which relieves him from checking the register. This, however, is not extensively used.

Identification of Trains.

Trainmen, operators and all who are in any way concerned in handling trains on the road should be impressed with the importance of positive identification of trains. This injunction is particularly applicable to operators, who, in many cases, are not careful about keeping a perfect record.

On almost every road there is some provision for describing regular trains in train orders, although this is not in the Standard Code. The custom most widely used is that of giving the engine number; some roads use the name of the conductor, and a few use both. Engine numbers are universally used to describe extra trains, sometimes with the addition of the conductor's name.

On many roads the cupola of the caboose is provided with a transparency, and trainmen are required to exhibit at all times such letters or characters as will indicate the train. (Fig. 22.) These indications differ somewhat but I believe the most common is, in the case of a regular train, to show the number of the train and which section. If there is no following section it is usually designated by the letter "L," which means "Last." First No. 27, therefore, would appear thus: 1—27. If there were no following section it would show L—27. An extra is designated by "X"

followed by the number of the engine. In the code of rules on a large system I find the following rule:

> When trains meet by special order or time table regulations, conductors and enginemen must inform each other what trains they are. This must be done by word of mouth.

This is largely the practice, especially when meeting by train orders. I have also known

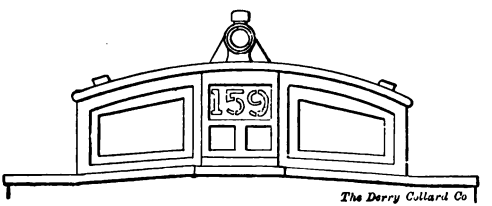

Fig. 22—Caboose indicator.

of the use of "Identification Slips" to be filled out and exchanged by trains when meeting. Some rules provide for these "slips" to be handed to the operator at each open telegraph office, thus giving him positive information as to the identity of the train.

I quote from the rules which are printed on what is known as the "Conductor's Exchange Register Ticket," which is in use on some lines.

> This form to be exchanged by time table trains of the same class at meeting and

passing points, and by all trains when meeting on train orders.

First class trains carrying signals for a train following, will exchange this form with all trains met or passsed.

Second and third class trains carrying signals, will exchange this form with all except first class trains.

While the above mentioned regulations are safeguards for the identification of trains, they can hardly be called essential as there are roads where none are in use. By a check of the register before starting and a careful observation of all trains met or passing on the road there should be no difficulty in knowing the situation at all times. It is, of course, possible for regular trains to follow each other in some other order than that indicated by the time table, and for cases of that kind I consider that some means of identification is desirable, yet such information can usually be obtained from the dispatcher and should be given by him to all trains affected.

Double Track.

Movement of trains on double track, three tracks or four tracks is, in many respects, so different from single track work, that, in considering it, we may say we enter a new field of study. There are no meeting points to be made, but the problem of moving trains with the least delay possible, is perhaps as serious.

This subject is now receiving more attention than it ever did before and the next few years will witness a great change for the better along this line. The growth of traffic and the necessity for additional tracks makes it one of increasing importance. The American Railway Association has given us the Standard Code of Double Track Rules, but they are only the single track rules so modified as to apply to double track. There are but few rules and forms of train orders which are distinctively for these conditions. There is a need for a more uniform system of train movements on double track, and increasing effort is being made toward that end.

On almost every American road trains use the right hand track, though a very few observe the English custom of keeping to the left. Passing tracks are provided at intervals, though the cross-overs are used more or less for passing purposes. Usually, trains are required to obtain permission to use cross-overs and must be protected by flag against trains on the opposite track. Passing tracks are usually outside of the main tracks, though the "middle track," a siding between the main tracks and accessible from either, is used to some extent.

The chief problem, of course, is in keeping slow trains moving with as little delay as possible without interfering with fast ones. The only order authorized by the Standard

Code by which an inferior train may be moved ahead of a delayed regular train is D—Form E, and this is as unsatisfactory as it is on single track. We have already referred to two roads where there is no distinction of "class," and a train continues to run until it is ordered by the dispatcher to allow another train to pass.

There are some lines where a train is run on the opposite track for a short distance, if it can by this means be kept moving, rather than to allow it to stop on a siding for a superior train to pass. On others the established direction of current of traffic is always maintained unless in case of accident.

On a few roads a third track has been added, and practice is varied concerning its use. One track may be used by trains in both directions and operated under single track rules, while the other two are used as double track. On some such lines the third track is used exclusively for one direction during certain hours when the volume of traffic demands it, and the direction is reversed during the remainder of the day. There are, however, few roads with three tracks, for when the traffic becomes too heavy for double track it is usually four-tracked.

There are probably few, if any, double track lines in these days where there is no form of block signaling. The "Telegraph Block Sys-

tem" is in use to some extent but is rapidly being replaced by more expensive, and consequently more efficient systems. In this system the station train order signals are used, operators communicating with each other by telegraph. In connection with a system of this kind on the Lake Shore and Michigan Southern, there is used what is known as the Right-Angle Semaphore, the several indications of which are shown in Figs. 12 to 15 inclusive. (See page 74.)

THE "MANUAL-CONTROLLED" SYSTEM is one where the signals (usually semaphores) are operated by the signalman but are so interlocked that a signal cannot indicate "clear" if the block is occupied.

AUTOMATIC SIGNALS are meeting with great favor and are being installed on many large systems. They are of the disc type (Fig. 23) or of the semaphore (Figs. 24 and 25), and provide both home and distant signals. On some roads there is a home and a distant signal at the entrance to each block (Fig. 24), the distant signal giving the indication for the next block ahead, so that if the engineer sees both signals clear he knows there are two clear blocks ahead of him. If the home signal indicates "proceed" and the distant signal "caution," the block about to be entered is clear, but he *may* find the next home signal at "stop" and must run accordingly.

Automatic systems are constructed so that

the normal position of signals may be either "proceed" or "stop." I believe the "normally clear" is most in favor.

With the "normally at danger" method the signals stand in the "stop" position until a train approaches the entrance to the block, when, if the block be clear, the signal will automatically change to "proceed." This change takes place in sight of the engineer and while the train is sufficient distance from the signal to avoid delay. Just as the engine reaches the signal it returns to "stop" and remains so until the train passes out of the block and another train is ready to enter. The engineman is required to see that these changes take place, as they are the evidence that the signal is in working order.

NIGHT COLORS. In the section on train order signals reference was made to the growing inclination to substitute green for white as a night indication for "proceed" and, when this is done, there is difficulty in finding a suitable color for "caution." For a single color, yellow is used mostly, but there are at least two lines, the Chicago and North-Western and the Union Pacific, where a combined green and red light indicates "caution." When the semaphore is dropped to the "clear" position the red light is concealed, showing only the green. The green and red indication comes from but one lamp, so that should it become accidentally extinguished no light would be shown. (Fig. 25.)

In Case of Accident on one track, requiring all traffic to be handled on single track, the men who are familiar only with double track work are at a disadvantage. This applies to both dispatchers and trainmen. If they are in the habit of varying from the established rule with regard to the "current of traffic" they will probably find it easier to temporarily run on single track, but where this is not done and where the division or system has no single track, and the men, in consequence, are unfamiliar with single track rules and usages, there seems to be a need for a system of rules and train orders, as nearly uniform as may be practicable, to be used in such emergencies.

It is probable that a few years will produce a system of rules covering movements on either track in either direction, just as the single track rules have been brought to their present state of efficiency, the principles of which are, beyond question, the best that have ever been used.

Words to Operators.

The subject of Train Identification leads us to consider the importance of the operator in the successful handling of trains. I regret that this is not realized by all operators. He is eyes and ears for the dispatcher. All the knowledge that the dispatcher has of the location of trains he gets from the operator. As

it is essential that he know the position of trains on his division so is it essential that the operator give him correct information in this regard. The operator cannot do this unless he observes correctly the identity and the time of every train passing his station. He should know at all times what trains have passed and what are yet to pass. He should be careful to note whether or not signals are carried and that markers are displayed, showing that the entire train has passed. It is quite as important for him to know these things as for trainmen.

One thing in which I have found much neglect is in keeping the correct time and making correct reports of passing trains. The movement of trains depends entirely on reports from the different stations, and the importance of accuracy in this matter cannot be too strongly emphasized. I have found clocks in telegraph offices as much as five minutes fast or slow, and when it is remembered that a difference of two minutes will sometimes determine a meeting point, the importance of correct reports is apparent.

The operator should realize that he is a very important part of the train dispatching department and that while the dispatcher is the man who actually directs the movements of trains, yet his orders are issued on the information obtained from the operator as to the conditions surrounding the trains affected. The dis-

patcher obtains his knowledge of these conditions largely by asking questions, but there is information which the operator can give without asking. Unexpected delays frequently happen, such as result from hot boxes, an unusual amount of work for either passenger or freight trains at stations, by railroad crossings or other obstructions, and in many cases the dispatcher does not know it until he asks for a report of the train which he thinks has left some time before. As it will not be disputed that this knowledge is of importance to the dispatcher, therefore we can view the matter in no other light than that it is the plain duty of the operator to endeavor to thus assist in getting trains over the road.

I am not unmindful of the fact that many operators have other duties, but I have sometimes imagined that this department did not receive equal attention with the others. It is possible for the operator to familiarize himself with train rules and the methods of moving trains by telegraph so that he can be a most valuable aid to the dispatcher. By this means there will be a better understanding between the two. The operator will see what the dispatcher wants to do and will endeavor to help him do it.

The dispatcher acknowledges in a large degree, his dependence on the operator. The former is responsible for the prompt movement of trains over his division but the latter

is, in an important sense, his assistant. He furnishes the information upon which orders are issued and serves as the medium to deliver the orders to the trains affected. How important, then, that the two should endeavor to work in harmony.

Dispatchers are chosen from the ranks of operators. It is the natural line of promotion for one in the telegraph service. Everything, it would seem, points to the necessity for the operator to familiarize himself with the duties and endeavor to advance the interests of this important department of the service.

The Dispatcher, Enginemen and Trainmen.

The dispatcher and the men on the train are like the two halves of a pair of scissors. Neither can accomplish much without the aid of the other. The greater the harmony of action between the two, the better the service that will be rendered and the more satisfactory the results in the operation of the division or system.

In the very nature of things it may be difficult for these two arms of the service to fully understand each other, owing to the difference in their training, yet I think this is the basis of the perfect harmony which is so desirable.

In order to attain as near to this as possible, I bespeak some charitable consideration on

the part of each toward the other. The dispatcher who makes a meeting point between two trains, one of which is delayed more than appears to be necessary, is very often the subject of unfavorable comment, even before any inquiries are made regarding the circumstances. On the other hand, the conductor of a freight train who says he "will be ready in five minutes" and who does not leave for twenty minutes, thus spoiling what would otherwise have been a nice meeting point, comes in for his share of criticism. He may be as entirely blameless in the matter as was the dispatcher in the former case; he may have been quite as justified in saying he would be ready in five minutes as was the dispatcher in making the meeting point above referred to. Let us exercise a little charity and do a little investigating before we fix the blame.

I believe that each should be better acquainted with the duties of the other. Dispatchers should be given the opportunity to go out on the road at frequent intervals without loss of sleep or compensation and without having to work overtime to pay for it. This provision is made on some roads, each dispatcher being given two days each month, one for the purpose mentioned, and the other entirely his own. This is a profitable investment to the company, for there is no question but many an unwise move is made on the dispatcher's checker-board which would not be

made, were he thoroughly familiar with the situation. This familiarity can only be obtained by actual contact with the work of the trains under his supervision and a personal knowledge of the road over which they run. Some may think differently, but I believe that the dispatcher who can see, in his mind's eye, every movement of a train as it is reported to him, is a better dispatcher than one who never sees the road or the trains except on the train sheet.

Experience has demonstrated that this knowledge cannot or will not be obtained by a dispatcher who is on duty from eight to nine hours every day in the year. With the amount and the character of work required of the average dispatcher of today he needs the fifteen or sixteen hours off duty for rest and recreation and should not be expected to devote any part of it to going over the road. In fact, after a hard day's work, he is not in fit condition for it. Rest is what he needs, not a continuation of labor.

It may be a little more difficult for the trainman to place himself in the position of the dispatcher, but he can easily see how it lies within his power to assist himself in getting over the road.

What was said to operators in the preceding chapter with regard to giving information to the dispatcher, will apply equally to trainmen. I know that a conductor has many things to

occupy his attention, but the movement of his train and other trains is quite as important as anything else and should not be neglected.

I have seen conductors report ready to go in five minutes, get a meeting order with an important train, go out in the yard, pull out a draw-bar or meet with other unexpected delay and make no effort to tell the dispatcher, when, in all probability, the opposing train, which he knows is important, is waiting at the next station for him.

Another fact which should be borne in mind by all who are concerned in handling trains, is that a busy dispatcher cannot always give orders the moment they are asked for, and in order to anticipate required movements as much as possible and arrange his work accordingly, he should have reasonable notice of when the expected train will be ready to move.

In this I do not refer so much to the movement of regular trains, but in cases where working orders are required, either by a train passing over the road or by a switch engine, or possibly a work train unexpectedly wanting to go outside of its working limits for water, fuel, or some other purpose. I recall a case where a yard engine was required to go outside of the yard limits to unload some material Nothing was said to the dispatcher until it was all ready to start. He was busy and could not leave the work he had in hand and

when he did get to it some little time was consumed in calling operators, sending the order to other stations to extras in each direction. After fifteen minutes the yard master said he could not wait all day, set the material back in the yard, went to his regular work and made a report of what he considered an unnecessary delay in getting orders. That night he gave notice that he would want working orders at 7 a. m. and he found them all ready for him at the appointed time.

This is not an isolated case. I speak of it only to show that with the American system of train dispatching it requires time to put out orders under normal conditions, and where a movement is called for without notice some work is necessary which might have been done in the way of preparation, had the movement been anticipated. A dispatcher endeavors to arrange his work so as not to stop a train for orders if it can be avoided, and when one of these sudden requests is presented he, in many cases, finds that he must stop a superior train for an order, while had he known it fifteen minutes before, he could have sent the order to a station where the train had stopped.

Sometimes a movement is lost and a train delayed by reason of not being able to get an order to it on short notice. A train is at a station waiting for a superior train, and instead of staying near enough to the telegraph office to keep in communication with the dispatcher,

goes to the extreme end of the long siding, around a curve perhaps. Some unexpected circumstances arise whereby, if the train were within easy distance it might be moved, but as it cannot be reached with orders a serious delay results.

I would urge upon trainmen the necessity of keeping in touch, as far as possible, with the dispatcher while at a station. The dispatcher should have a hold on the train and it should not be cleared until it is ready to leave, if such is possible. I am well aware that many yards and telegraph offices are not so arranged as to make this possible, but in such cases the movement of trains is more than likely to suffer. The dispatcher cannot move trains unless he can get orders to them and if a train must be cleared ten, fifteen or twenty minutes before it is expected to leave, and that leaving time decidedly uncertain, it would seem that the train dispatching department was not properly provided for.

Suggestions to Young Dispatchers.

While a person cannot learn to be a train dispatcher by reading a book, yet a few things can be recorded in print which may serve as a guide and help the beginner to avoid some situations which have brought unpleasantness to those who have gone before him.

Conditions vary widely, and, in many respects, the work of dispatchers is quite different in different places, yet the general principles are the same. Eastern roads, with plenty of telegraph offices and with both day and night operators, make a different sort of work from those in the far West, where, especially at night, trains run fifty miles or more between telegraph offices. There is a difference between a fifty mile district with a large number of trains, and three or four districts, with as many train sheets and train wires, covering a territory of 500 miles, which condition exists on some Western lines. Trains are, of course, not so numerous on any one district, but our experience has been that, East or West, the dispatcher has his difficulties, works hard and is entitled to more appreciation than is often accorded him.

On the average road, I believe the hours of the night, when only a few telegraph offices are open, are the hardest for the dispatcher. A freight train leaves an open telegraph office and cannot be expected at the next one for several hours. The dispatcher should provide such a train with help on superior trains, not only to cover the time it may reasonably be expected to "come out of the dark," but to provide for probable or possible delays. Suppose an extra leaves a station at 1 a. m. and should have plenty of time to make the next open telegraph office for No. 6, which is due

at 2:45 a. m. If he knows that No. 6 is to be 30 minutes late it is wise to give the extra that 30 minutes. He may "fall down" and the 30 minutes may save him two hours.

Under the same conditions, if our extra is not important and an extra in the opposite direction is of such a character that we do not want to run the risk of a serious delay, our second named extra should have right over the first with "wait" orders at such stations as may be of use to the extra of lesser importance. "Meet" orders between trains of unequal importance should only be given when all telegraph offices are open and conditions are such that, in the event of unexpected delay to the inferior train, it can be reached and the order changed.

The dispatcher should study conditions and exercise his judgment as to the use of the "meet" or the "time" order. It is very seldom that I should use a "meet" order between passenger and freight trains, though the freight train may be of so great importance as to warrant *taking the risk* of holding the passenger train by making the time order three or four minutes longer than the anticipated actual time.

Between freight trains, even of varying importance, when all telegraph offices are open, and there is a reasonable certainty of being able to hold the inferior train in case of unexpected delay, I believe the "meet" order is by

far the best. An important freight train is going over the division, stopping at only two or three points, and an extra is running in the opposite direction. The dispatcher gives the important train a "wait" at a certain station. The inferior train is delayed a little and needs about five minutes more to make the point. The superior train does not make quite as good time as was expected and five minutes more will not delay it. Another order must be sent if the proper meet is made, perhaps involving the stopping of the important train for the order. A meeting order would have been better in the first place, with a comparatively small chance of having to change it.

But there are times when the "meet" order would involve considerable risk of delay to the superior train. An unimportant train reports "ready in five minutes." All he has to do is pick up one car. But that car is at the other end of the yard where the train is beyond reach of the dispatcher in case an unexpected delay occurs. A "time" order is the proper thing in this case, if the superior train is of much greater importance.

The "meet" order has also been used in other ways that have resulted in delays to trains, with consequent unpleasantness for the dispatcher who issued it. He has given an engine an order to work until a certain time betwen certain points and meet No. 51 (for instance) at a certain station. The time expires and No. 51 comes to the point named

and does not see the engine named in the order. The question arises, what is No. 51 to do? The working time has expired, yet the only way trains can *meet* is by being at the same place at the same time. In this case the superior train should have a "wait" order at the station named. A "meet" order should never be issued unless it is anticipated that these conditions will be fulfilled, or provision made for notifying the superior train that the inferior has arrived.

If the inferior train is liable to reach the point and go away from the station so that the superior train cannot see it, it is a good idea to use a "wait" order if the time can be made such as will not delay the superior train and yet give plenty of time to the inferior. This order will not require any further attention on the part of the dispatcher if the inferior train should arrive and go away from the main line. If, however, a time order cannot be so arranged, a "right" order should be used, but some arrangement must be made, either between the trains, or by the dispatcher, for notifying the superior train if the other arrives and goes from view.

No. 2 runs from A to K, No. 1 from K to A. No. 2 is the superior train. The proper meeting point seems to be at D, and it is also the most convenient place to send the order to No. 2, which is done in this form:

No. 2 will meet No. 1 at D. No. 2 gets this order at D.

Later it is necessary to change the meeting point to C. The rules require that orders must be given in the same words to all concerned and the second order reads:

No. 2 will meet No. 1 at C instead of D.

That is all right for No. 1, but it cannot be given to No. 2 in those words, for that train has not received the first order. The first order should have been:

No. 1 has right over No. 2, K to D.

Had this been done a "meet" order could subsequently have been sent to each train in the same words.

Under the same conditions as above, D is the regular meeting point. E is a non-telegraph station. First No. 1 leaves F with time enough to make D. Second No. 1 is a little short of time and gets an order to meet No. 2 at D. The first section is delayed and takes the siding at E, where the second overtakes it. The latter cannot pass the former and No. 2 cannot leave D until the second section gets there. The proper course would have been to make the order read "No. 2 will meet 1st and 2d No. 1 at D," and instructed the second to deliver a copy of the first if overtaken. "Blind sidings" or non-telegraph stations often figure in the work in such a way that some precaution should be taken to guard against unexpected delay.

In a general way, care should be used in sending orders to avoid complications or a large amount of work in case of necessary

change. An order like this was once issued:

No. 27 will wait at B until 12:20 p. m. and at C until 12:35 p. m. for 1st No. 52, will meet 2d No. 52 at D, 3d No. 52 at E and will run 35 minutes late D to F.

The time proved to be too close at B and C and had to be taken up. There were two ways by which it could be done, but either was quite long, and if the "waits" had been put in a separate order it could have been annulled by number in a few words. I do not mean to discourage the sending of long orders, but sometimes the possibility of having to annul a part of the order can be foreseen, and this should always be considered.

I believe in giving a freight train every possible minute on a passenger train. I have heard dispatchers say, "I cannot give him more than five minutes and that is not enough to pay for putting out the order." That five minutes may save an hour for the inferior train, and I think it better to give it. I also give the odd minute if possible. If I think 8:25 is a little too much to hold the passenger train, yet I know that it will not be at the station at 8:20, I make it 8:22 or 8:23.

Generally speaking, when a passenger train is late, I move opposing freight trains on "wait" orders. "Run late" orders are not very satisfactory for movements of this kind. It is hard to give the opposing train "every minute there is in it." For freight trains

running ahead of a passenger train which is late, the "run late" form is all that can be used, according to the Standard Code.

There is a form in use on some roads which is far superior to the "run late" order for trains in the same direction and is equal to the "wait" order for trains in the opposite direction. It is given in the following form or one similar:

No. 1 will wait at A until 7:20 p. m.
No. 1 will wait at B until 7:30 p. m.
No. 1 will wait at C until 7:40 p. m.
etc.

The time can be used at as many or as few stations as may be necessary, can be used by trains in either direction, and the "last minute" can be put on the superior train, which cannot be done with the "run late" form. Another form usually accompanies, or if not, it *should* accompany this form, requiring the train to run later than the time given in the original order. It is worded after this fashion:

No. 1 will run 20 minutes later than time in Order No. 27.

I think these are two valuable forms and are worthy to be incorporated in any code.

In putting out orders the dispatcher should be governed, in some cases, by the location of passing sidings, the knowledge of which, it is needless to say, is indispensable to good work. An extra is going east against No. 1, a west bound passenger train. The dispatcher

sees that he must help the extra, for No. 1 is some late. The extra is running from A to K and it is evident that it can make D without help, therefore, in order to get as late a report as possible on No. 1, the dispatcher thinks he will not give the help to the extra until it reaches D, or at least has passed C. At D the siding extends half a mile west of the station and around a curve. The extra, not being able to make E for No. 1, stops and pulls through the siding, and when it arrives at the station finds an order giving it time enough to make E if it had not stopped to take the siding, but is now useless. Knowing the conditions, the dispatcher should have given the extra an order at C which would at least have taken it up the main track at D, where further help could have been given, if possible.

These are only a few of the peculiar positions which experience will reveal to the young dispatcher. Occasionally a new experience comes to an old dispatcher, also. In fact, I doubt if one can grow so old in the service that there will be nothing new to learn. There are situations and complications which cannot be mentioned in the book of rules and which do not appear in the ordinary list of examination questions, but they do appear, forcibly, and at more or less frequent intervals, to the dispatcher, and only experience will teach him the ways and means to be employed to safely guide his trains from initial

point to terminus, with the least possible delay.

I wish here to speak of the value of the "19" order. By using judgment and forethought it can be used to advance many a train which would not have time to go to the next station if it was required to stop and sign a "31" form. By its use a freight train can often be kept moving when, to stop it would require 15 minutes or more to get started.

No. 61, an important freight train, is leaving K. An extra is leaving D. The dispatcher cannot tell whether the meeting point should be F or G. He makes it at G, so that it can be changed to F, if found necessary, by giving No. 61 (the important train) a "19" order which will allow it to keep moving. This principle in using the "19" order will save stopping an important train in many cases. Its rights can be restricted at a place where it is necessary to stop and, if found necessary, those restrictions can be partially or wholly removed by the use of the "19" order.

It is important that the dispatcher should know all the stops which a freight train may be expected to make, as meeting points depend largely on this. A good plan is to place a pencil dot on the train sheet in the space intended for the time of the train, and if a goodly number of dots appear in the column of one train it can be seen at a glance that it will not make a very fast run over the

division. It is also very desirable to avoid stopping trains for orders, and to send them, so far as possible, to points where the train is required to stop. This method of having a record of expected stops in plain sight is much better, I think, than to look through a pile of messages for the information at a time when every moment is valuable.

Almost every dispatcher has at some time brushed up against the man on the connecting district or the yard master at the terminal on the question of reporting the expected arriving time of trains. It may be impossible to make a copy of every such message sent, but I have known men to help themselves out of such difficulties by putting the time the train was reported, together with the time the message was sent, at the head or foot of the column of the train on the sheet. Draw a circle around the time the message was sent to distinguish it from the time the train is to arrive, and I guarantee that some day you will be glad you did it.

It is a good practice to keep copies of all messages sent, yet a busy dispatcher, without a copier, does not always have time to do this.

I feel that dispatchers do not always exercise sufficient care in making a transfer to the relieving dispatcher and in giving him all the necessary information so that the work may continue without interruption. I believe, in

the first place, that the transfer should contain only the number of the orders in effect, and the parts of such orders as may already be executed should be crossed off with pencil so that the relieving dispatcher will read the order as originally written, with all notations pertaining to it, but will not read what has already been fulfilled. On a busy division it is impossible for one to sit down to the train sheet and grasp every detail of the situation immediately, and it is therefore incumbent upon the retiring dispatcher to call attention to the things that are of first importance, lest they may be neglected until too late. It is also a good idea to make notes of such information as may need to be given, not only because the man going off duty is liable to forget it, but the one who is going to work may overlook something if a large amount of verbal information is given at that time. Before going off duty the dispatcher should examine the messages relating to the work of trains, etc., and file all the instructions and information which are no longer in effect. Many messages can be filed at a glance by him who has followed the course of the work for several hours, while one unfamiliar must read them carefully and compare with the train sheet to ascertain whether or not they have been executed. Much depends on the care in making a transfer and occasionally work is retarded by the lack of such care.

The Department of Train Dispatching--What Is It?

On many roads the work of the dispatcher, that of "getting trains over the road," is classed as a part of the transportation department. His business is transacted in the name of the superintendent, assistant superintendent or train master. On some lines instructions and train orders are signed by the chief dispatcher, but I know of only one American system (and that is in Canada), where train orders are signed by the person who issues them, the train dispatcher. On a few roads the dispatcher's initials appear with the "complete" on a train order, and occasionally we see his name printed on the time table, but generally speaking, he is unknown in any official sense, his identity being concealed behind the name of a higher official who never issues a train order nor even directly authorizes it.

Whether or not it is advisable to bestow an individuality upon the work of moving trains, I feel that this branch of the service has a distinctiveness and should be classed by itself, quite as much as the department in charge of the road master or the superintendent of telegraph.

The ordinary conception of the "train dispatching department" begins and ends with a chief and three men, the former to order trains

and arrange matters relative to equipment, tonnage, etc., and the latter to give such orders as will move trains as speedily as may be, over the division. This is correct, but, in my opinion, there are many things concerned in "moving trains" which do not appear in the book of rules or on the train sheet. Neither are they apparent to one who does not give close attention to this character of work. They do appear, often unpleasantly, to the dispatcher.

Under the head of the "department of train dispatching" are classed all matters which are in any way concerned in the movement of trains. We cannot move trains successfully and expeditiously without proper facilities, any more than the ancient Israelites could make good bricks without straw.

One of the most important items in handling trains is proper telegraphic facilities, by which a train can be seen when leaving a station and properly reported, and also where it can be reached by the dispatcher while standing at a station. The location of telegraph offices is, in many cases, a positive detriment to the work of this department. This is especially true at terminals, where, in many cases, an operator must clear a train fifteen minutes or more before it is expected to leave. It is often delayed after the expected time, with no way for the dispatcher to send an order to it, especially one which restricts its rights. Sometimes the operator is not in a position to see

the train when it leaves. He reports it from the register, which is equivalent to no report at all, and the dispatcher waits until it reaches the first open telegraph office, perhaps a distance of 25 miles, to know, with any degree of certainty, where the train is. Some telegraph offices at intermediate stations are so located, with reference to the passing siding, that the conditions are much the same as above described. As the dispatcher's calculations are based on the time a train leaves a station, it would seem that the importance of providing facilities for obtaining correct information should be more fully realized.

I once knew an important junction point, where all freight trains had more or less work. It was done at a point a half mile from and out of sight of the telegraph office. The time of leaving the yard was a mere matter of guess-work. Meeting points were made, trains on the adjoining district were ordered and crews called on these guesses, which were sometimes far from correct. A telephone or electric bell connection between the telegraph office and the end of the yard would have cost but little compared with the expense of the unavoidable delays which occurred.

A train waiting at a station to be met or passed by another, may sometimes be unexpectedly moved if orders can be delivered to it quickly, while if it requires ten or fifteen minutes to get the conductor in the office, the move may be lost.

Telegraph offices are sometimes located where it is impossible to see approaching trains for any considerable distance. There are times when a good view is of great advantage to the dispatcher, for there are cases, especially at night, when there are certain orders which cannot be sent until it is known that an expected train is at a certain station, or will be there soon.

The form and location of train order signals are sometimes far from what they should be. The double arm semaphore is considered to be the best form, and its location is as important, for high speed trains, as any other class of signal.

A conspicuous example of determined effort to provide the best facilities for moving trains is shown on some of the single track divisions of the Pennsylvania Lines. On one of these divisions, 100 miles in length, where there was a necessity for improved conditions, a map of the division was taken and a line drawn every five miles. This was taken as the basis for the location of passing sidings. The siding was located at that point if grades were favorable, and if not, as near to it, east or west, as was practicable. No attempt was made to locate them at stations if the movement of trains could be improved by putting them elsewhere. If a siding had formerly been at the foot of a heavy grade, a new one was constructed, perhaps half a mile away, where

trains often backed "to get a run for the hill."

The "lap-sidings" were installed in place of the ordinary side track and each was made long enough to hold three ordinary freight trains, so that each pair of these sidings is equivalent to more than a mile of double track, with a cross-over. (Fig. 26.) In nearly every case the two switches nearest the telegraph office are moved by the operator, thus effecting a saving of time to trains. Ordinarily trains enter the siding at the first switch, following the rule of keeping to the right. This arrangement brings the engine of the leading train near the telegraph office while standing on the siding, which is essential to good train dispatching.

There were one or two places on this division where conditions made it difficult to follow the general plan of using the lap-sidings. One, in particular, where each siding was located on a grade, the telegraph office, or tower, being at the summit. Here the order of taking the siding is reversed and trains enter at the switch nearest the telegraph office, thus avoiding a stop on the hill to open the switch, while in leaving the station it is on a descending grade. (Fig. 27.) This has the disadvantage of the trains "feeding" away from the tower rather than toward it, but it is the best arrangement where such conditions exist.

The extreme ends of the lap-sidings being a

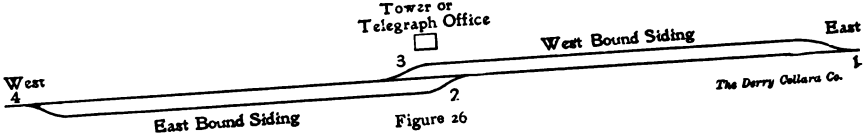

Figure 26

A lap-siding.

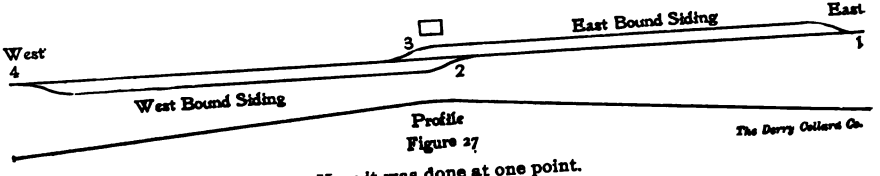

Figure 27

How it was done at one point.

mile or more apart, it may make several minutes in a meeting point, especially between passenger trains, whether they meet at one switch or the other. To further facilitate train movements the switches are numbered as shown in Fig. 27, the most easterly being No. 1. In giving train orders the dispatcher designates, if desired, the number of the switch at which trains are to meet or "wait" and the rule is that the train which can "head in" on the siding will do so. Orders concerning the switches handled by the operator are also sent to him.

The facilities for entering and leaving sidings being important factors in this department of the service, much may be accomplished at the ordinary station by the use of "parallel sidings" (Fig. 28), making it the rule for trains to "keep to the right," or take the right hand siding. When trains in opposite directions are waiting for a superior train to pass this will avoid the necessity of one train backing out. It also has a tendency to keep trains near the telegraph office, providing the latter is properly located.

The value of a long passing siding, if that is the best that can be afforded, is greatly increased by one or more cross-overs or "cut-offs" between it and the main track (Fig. 29), thus avoiding the necessity, in many cases, of trains "backing out."

Many times are we faced with the fact that

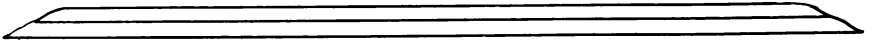

Figure 28

Parallel siding.

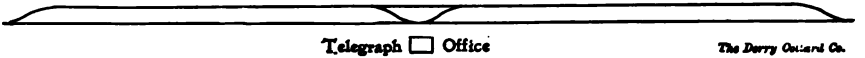

Figure 29

Passing siding with cross-overs.

agents, with duties in several departments, seem to consider that the dispatcher and the train wire are of lesser importance. They should be instructed and educated that the prompt movement of trains affects the earnings of the road quite as much as the successful operation of any other department, and that their duties as operators are quite as important as along any other line.

The train wire is sometimes used as a message wire, and while the dispatcher's business, of course, takes preference over messages, yet it often interferes with his work.

Conditions in the dispatchers' office are often detrimental to the movement of trains. I have seen places where the dispatcher acts as terminal operator, for both passenger and freight trains, handling all orders which are required for delivery at that point. Many times, when he is busy with wire work, he is compelled to stop and deliver from one to a half dozen orders to a conductor, listen while he reads them, answer numerous questions, necessary and otherwise, then return to his table to pick up the thread of his operations on the road, perhaps to find that a passenger train at some distant station has been waiting several minutes to get "complete" to an order. The arranging of manifold and carbon sheets and the writing and delivering of train orders is a hindrance to a busy dispatcher, for while he is doing that he can do no work on the wire,

and where his office is open to trainmen he is subjected to all sorts of questions and interruptions. I believe the dispatcher's office should be private and that an operator should handle the train orders.

Provision for the expeditious movement of trains has not been given attention commensurate with its importance. To lay a side track and install a telegraph office at each station, or the most important stations, without any particular thought as to how far they will successfully contribute to this end, does not produce satisfactory results.

To make the dispatcher responsible for all transportation matters in addition to the handling of trains has proven that a man cannot do a half dozen things at one time, and something is slighted or not done at all.

To allow the work of train movements to so accumulate that the dispatcher cannot even keep up the reports of trains on his sheet, and is compelled to make "random shots" at meeting points without having time to follow up the trains to see whether they are right or wrong, is to invite delays and make a favorable opportunity for him to overlook something. This will prove more expensive than several years' salary of another dispatcher.

The dispatcher needs time to *think*. He must measure and lay out his work just as truly as the architect or the builder. The less the facilities in the way of telegraph serv-

ice, side tracks, etc., the more *thinking* is necessary. When he is crowded to the utmost of human capacity, he has no use for this, and his work shows it. It is a mistaken idea that because a dispatcher is not sending orders continuously he is not working. Let no one attempt to estimate the amount of his work by the number of orders he sends. Unlike other officers who do the thinking and tell some one else to do the work, he does both. Very often he does both at the same time, as well as he can.

The author has attempted to produce in this volume something useful to those concerned in the handling of trains, both employer and employee, and he will feel repaid for his work if, by any suggestion herein contained, he may lead to a better understanding of the conditions affecting the work of the train dispatching department.

THE STANDARD CODE

OF THE

AMERICAN RAILWAY ASSOCIATION

TRAIN RULES FOR SINGLE TRACK. **Adopted** April 12, 1899; with amendments **agreed to** April 24, 1901, and April 23, 1902.

TRAIN RULES FOR DOUBLE TRACK.—**Adopted** April 23, 1902.

DIAGRAMS OF HAND, FLAG AND **LAMP SIGNALS** AND TRAIN SIGNALS.—**Adopted April 24, 1901.**

General Notice.

To enter or remain in the **service is an** assurance of willingness to obey **the rules.**

Obedience to the rules is **essential to the** safety of passengers and employes, **and to the** protection of property.

The service demands the **faithful, intelli-**gent and courteous discharge of duty.

To obtain promotion capacity must **be shown** for greater responsibility.

Employes, in accepting employment, **assume** its risks.

Definitions.

TRAIN.—An engine, or more than one engine coupled, with or without cars, displaying Markers.

REGULAR TRAIN.—A Train represented on the time-table. It may consist of Sections.

SECTION.—One of two or more trains running on the same schedule displaying signals or for which signals are displayed.

EXTRA TRAIN.—A train not represented on the time-table. It may be designated as—

Extra—for any extra train, except work extra;

Work extra—for work train extra.

SUPERIOR TRAIN.—A train having precedence over other trains.

A train may be made superior to another train by RIGHT, CLASS or DIRECTION.

RIGHT is conferred by train order; CLASS and DIRECTION by time-table.

RIGHT is superior to CLASS or DIRECTION. DIRECTION is superior as between trains of the same class.

TRAIN OF SUPERIOR RIGHT.—A train given precedence by train order.

TRAIN OF SUPERIOR CLASS.—A train given precedence by time-table.

TRAIN OF SUPERIOR DIRECTION.—A train given precedence in the direction specified in the time-table as between trains of the same class.

NOTE.—Superiority by direction is limited to single track.

TIME-TABLE.—The authority for the movement of regular trains subject to the rules. It contains the classified schedules of trains with special instructions relating thereto.

SCHEDULE.—That part of a time-table which prescribes the class, direction, number and movement of a regular train.

MAIN TRACK.—A principal track upon which trains are operated by time-table, train orders or by block signals.

SINGLE TRACK.—A main track upon which trains are operated in both directions.

DOUBLE TRACK.—Two main tracks, upon one of which the current of traffic is in a specified direction, and upon the other in the opposite direction.

CURRENT OF TRAFFIC.—The direction in which trains will move on a main track, under the rules.

STATION.—A place designated on the time-table by name, at which a train may stop for traffic; or to enter or leave the main track; or from which fixed signals are operated.

SIDING.—A track auxiliary to the main track for meeting or passing trains, limited to the distance between two adjoining telegraph stations.

FIXED SIGNAL.—A signal of fixed location indicating a condition affecting the movement of a train.

YARD.—A system of tracks within defined limits provided for the making up of trains,

storing of cars and other purposes, over which movements not authorized by time-table, or by train order, may be made, subject to prescribed signals and regulations.

YARD ENGINE.—An engine assigned to yard service and working within yard limits.

PILOT.—A person assigned to a train when the engineman or conductor, or both, are not fully acquainted with the physical characteristics, or running rules of the road, or portion of the road, over which the train is to be moved.

NOTE TO DEFINITION OF FIXED SIGNALS.—The definition of a "Fixed Signal" covers such signals as slow boards, stop boards, yard limits, switch, train order, block, interlocking, semaphore, disc, ball or other means for indicating stop, caution or proceed.

Rules for Single Track.

Standard Time.

1. Standard Time obtained from ——— observatory will be telegraphed to all points from designated offices at ———, —— m. daily.

2. Watches that have been examined and certified to by a designated inspector must be used by conductors and enginemen. The certificate in prescribed form must be renewed and filed with ——— every ———.

(Form of Certificate.)

CERTIFICATE OF WATCH INSPECTOR.

This is to certify that on.....19....
the watch of.....
employed as.....
on the.....R.....
was examined by me. It is correct and reliable, and in my judgment will, with proper care, run within a variation of thirty seconds per week.

Name of Maker.....
Brand.....
Number of Movement.....
Open or hunting case.....
Metal of case.....
Stem or key winding.....

Signed,

.....
Inspector.

Address .....

3. Watches of conductors and enginemen must be compared, before starting on each trip, with a clock designated as a Standard Clock. The time when watches are compared must be registered on a prescribed form.

Time-Tables.

4 (A). Each Time-table, from the moment it takes effect, supersedes the preceding Time-table.

A train of the preceding Time-table thereupon loses both right and class, and can thereafter proceed only by train order.

No train of the new Time-table shall run on any division until it is due to start from its initial station, on that division, after the Time-table takes effect.

4 (B). Each Time-table, from the moment it takes effect, supersedes the preceding Time-table. A train of the preceding Time-table shall retain its train orders and take the schedule of the train of the same number on the new Time-table.

NOTE TO RULE 1.—In order to detect possible errors at junction points and to secure uniformity, the Committee recommends that the time be disseminated to all points at the same hour. The Committee considers it of great importance that the time be obtained from some observatory of recognized standing.

NOTE TO RULE 3.—The conditions under which conductors and enginemen whose duties preclude access to a standard clock are required to obtain standard time, vary so much on different roads that the Committee recommends that each adopt such regulations to cover the case supplementary to this rule, as may best suit its own requirements.

A train of the new Time-table which has not the same number on the preceding Time-table shall not run on any division until it is due to start from its initial station, on that division, after the Time-table takes effect.

5. Not more than two times are given for a train at any station; where one is given, it is, unless otherwise indicated, the leaving time; where two, they are the arriving and the leaving time.

Unless otherwise indicated, the time applies to the switch where an inferior train enters the siding; where there is no siding it applies to the place from which fixed signals are operated; where there is neither siding nor fixed signals, it applies to the place where traffic is received or discharged.

Schedule meeting or passing points are indicated by figures in **full-faced type.**

Both the arriving and leaving time of a train are in full-faced type when both are meeting or passing times, or when one or more trains are to meet or pass it between those times.

When a train takes a siding, extending between two adjoining telegraph stations, to be

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NOTE TO RULES 4 (A) AND 4 (B).—The Committee has recommended two forms of Rule 4, leaving it discretionary with each road to adopt either, as best suits its own requirements.

NOTE TO RULE 5.—The Committee recommends that each company adopt such method as it may prefer in filling the blank.

passed by one or more trains, the time at each end of the siding will be shown in full-faced type.

Where there are one or more trains to meet or pass a train between two times, or more than one train to meet a train at any station, attention is called to it by ———.

6. The following signs when placed before the figures of the schedule indicate:

"s"—regular stop:

"f"—flag stop to receive or discharge passengers or freight:

"¶"—stop for meals:

"l"—leave:

"a"—arrive.

Signal Rules.

7. Employes whose duties may require them to give signals, must provide themselves with the proper appliances, keep them in good order and ready for immediate use.

8. Flags of the prescribed color must be used by day, and lamps of the prescribed color by night.

9. Night signals are to be displayed from sunset to sunrise. When weather or other conditions obscure day signals, night signals must be used in addition.

NOTE TO RULE 5. The committee recommends that each company adopt such method as it may prefer in filling the blank.

Visible Signals.

10. COLOR SIGNALS.

COLOR.	INDICATION.
(*a*) Red.	Stop.
(*b*) White	Proceed, and for other uses prescribed by the Rules.
(*c*) Green	Proceed with caution, and for other uses prescribed by the Rules.
(*d*) Green and white	Flag stop. See Rule 28.
(*e*) Blue.	See Rule 26.

11. A fusee on or near the track burning red must not be passed until burned out. When burning green it is a caution signal.

12. HAND, FLAG AND LAMP SIGNALS.

MANNER OF USING.	INDICATION.
(*a*) Swung across the track.*	Stop.
(*b*) Raised and lowered vertically.†	Proceed.
(*c*) Swung vertically in a circle across the track when the train is standing.‡	Back.
(*d*) Swung vertically in a circle at arm's length across the track, when the train is running.§	Train has parted.
(*e*) Swung horizontally in a circle, when the train is standing.¶	Apply air brakes.
(*f*) Held at arm's length above the head when train is standing.o	Release air brakes.

NOTE TO RULE 10.—The committee has omitted giving the colors of signals (*b*) and (*c*) in Rule 10, leaving it discretionary with each road to use such colors as it may prefer.

* Illustrated by diagram on page 195.
† Illustrated by diagram on page 196.
‡ Illustrated by diagram on page 197.
§ Illustrated by diagram on page 198.
¶ Illustrated by diagram on page 199.
o Illustrated by diagram on page 200.

13. Any object waved violently by any one on or near the track is a signal to stop.

Audible Signals.

14. ENGINE STEAM WHISTLE SIGNALS.

NOTE.—The signals prescribed are illustrated by "o" for short sounds; "——" for longer sounds. The sound of the whistle should be distinct, with intensity and duration proportionate to the distance signal is to be conveyed.

SOUND.	INDICATION.
(*a*) o	Stop. Apply brakes.
(*b*) —— ——	Release brakes.
(*c*) —— o o o	Flagman go back and protect rear of train.
(*d*) —— —— —— ——	Flagman return from west or south.
(*e*) —— —— —— —— ——	Flagman return from east or north.
(*f*) —— —— ——	When running, train parted; to be repeated until answered by the signal prescribed by Rule 12 (*d*).* Answer to 12 (*d*).*
(*g*) o o	Answer to any signal not otherwise provided for.
(*h*) o o o	When train is standing, back. Answer to 12 (*c*)† and 16 (*c*).
(*j*) o o o o	Call for signals.
(*k*) —— o o	To call the attention of trains of the same or inferior class to signals displayed for a following section.
(*l*) —— —— o o	Approaching public crossings at grade.
(*m*) ————	Approaching stations, junctions and railroad crossings at grade.

A succession of short sounds of the whistle is an alarm for persons or cattle on the track, and calls the attention of trainmen to danger ahead.

* See diagram, page 198. † See diagram, page 197

15. The explosion of one torpedo is a signal to stop; the explosion of two not more than 200 feet apart is a signal to reduce speed, and look out for a stop signal.

16. AIR-WHISTLE OR BELL-CORD SIGNALS.

SOUND.	INDICATION.
(*a*) Two.	When train is standing, start.
(*b*) Two.	When train is running, stop at once.
(*c*) Three.	When train is standing, back the train.
(*d*) Three.	When train is running, stop at next station.
(*e*) Four.	When train is standing, apply or release air brakes.
(*f*) Four.	When train is running, reduce speed.
(*g*) Five.	When train is standing, call in flagman.
(*h*) Five.	When train is running increase speed.

TRAIN SIGNALS.

17. The head-light will be displayed to the front of every train by night, but must be concealed when a train turns out to meet another and has stopped clear of main track, or is standing to meet trains at the end of double track or at junctions.

18. Yard engines will display the head-light to the front and rear by night. When not provided with a head-light at the rear, two white lights must be displayed. Yard engines will not display markers.

19. The following signals will be displayed, one on each side of the rear of every train, as markers, to indicate the rear of the train: By day, a green flag. By night, a green light

to the front and side and a red light to the rear, except when the train turns out to be passed by another and is clear of main track, when a green light must be displayed to the front, side and to rear.*

20. All sections of a train, except the last, will display two green flags and, in addition, two green lights by night, in the places provided for that purpose on the front of the engine.†

21. Extra trains will display two white flags and, in addition, two white lights by night, in the places provided for that purpose on the front of the engine.‡

22. When two or more engines are coupled to a train, the leading engine only shall display the signals as prescribed by Rules 20 and 21.

23. One flag or light displayed where in rules 19, 20 and 21 two are prescribed will indicate the same as two; but the proper display of all train signals is required.

24. When cars are pushed by an engine (except when shifting or making up trains in yards) a white light must be displayed on the front of the leading car by night.§

25. Each car on a passenger train must be connected with the engine by a communicating signal appliance.

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* Illustratedby diagrams on pages 203, 205, to 208.
‡ Illustrated by diagrams on pages 204, 205.
§ Illustrated by diagrams on pages 202, 203.
† Illustrated by diagrams on page 210.

26. A blue flag by day and a blue light by night, displayed at one or both ends of an engine, car or train, indicates that workmen are under or about it. When thus protected it must not be coupled to or moved. Workmen will display the blue signals and the same workmen are alone authorized to remove them. Other cars must not be placed on the same track so as to intercept the view of the blue signals, without first notifying the workmen.

USE OF SIGNALS.

27. A signal imperfectly displayed, or the absence of a signal at a place where a signal is usually shown, must be regarded as a stop signal, and the fact reported to the [illegible].

28. The combined green and white signal is to be used to stop a train only at the flag stations indicated on the schedule of that train. When it is necessary to stop a train at a point that is not a flag station for that train, a red signal must be used.

29. When a signal (except a fixed signal) is given to stop a train, it must be acknowledged as prescribed by Rule 14 (*g*).

30. The engine-bell must be rung when an engine is about to move.

31. The engine-bell must be rung on approaching every public road crossing at grade, and until it is passed; and the whistle must be sounded at all whistling-posts.

32. The unnecessary use of either the whistle or bell is prohibited. They will

be used only as prescribed by rule or law, or to prevent accident.

33. Watchmen stationed at public road and street crossings must use red signals only when necessary to stop trains.

Classification of Trains.

81. Trains of the first class are superior to those of the second; trains of the second class are superior to those of the third; and so on. Extra trains are inferior to regular trains.

All trains in the direction specified in the Time-table are superior to trains of the same class in the opposite direction.

82. Regular trains twelve hours behind their schedule time lose both right and class, and can thereafter proceed only by train order.

Movement of Trains.

83. A train must not leave its initial station on any division, or a junction, or pass from double to single track, until it has been ascertained whether all trains due, which are superior, or of the same class, have arrived or left.

84. A train leaving its initial station on each division, or leaving a junction, when a train of the same class in the same direction is overdue, will proceed on its schedule, and the overdue train will run as prescribed by Rule 91.

85. A train must not start until the proper signal is given.

86. An inferior train must keep out of the way of a superior train.

87. A train failing to clear the main track by the time required by rule, must be protected as prescribed by Rule 99.

88. At meeting points between trains of the same class the inferior train must clear the main track before the leaving time of the superior train, and must pull into siding when practicable. If necessary to back in, the train must first be protected, as prescribed by Rule 99, unless otherwise provided.

89. At meeting points between trains of different classes the inferior train must take the siding and clear the superior train at least five minutes, and must pull into the siding when practicable. If necessary to back in, the train must first be protected as prescribed by Rule 99, unless otherwise provided.

An inferior train must keep at least five minutes off the time of a superior train in the same direction.

90. Trains must stop at schedule meeting or passing stations, if the train to be met or passed is of the same class, unless the switches are right and the track clear. Trains should stop clear of the switch used by the train to be met or passed in going on the siding.

NOTE TO RULES NOS. 88 AND 89.—The Committee recommends, that where greater clearance is necessary, Rule No. 88 should require a clearance of FIVE minutes, and Rule 99 of TEN minutes.

When the expected train of the same class is not found at the schedule meeting or passing station, the superior train must approach all sidings prepared to stop, until the expected train is met or passed.

91. Unless some form of block signals is used, trains in the same direction must keep at least five minutes apart, except in closing up at stations.

92. A train must not arrive at a station in advance of its schedule arriving time.

A train must not leave a station in advance of its schedule leaving time.

93. A regular train which is delayed, and falls back on the time of another train of the same class, will proceed on its own schedule.

94. A train which overtakes a superior train or a train of the same class, so disabled that it cannot proceed will pass it, if practicable, and if necessary will assume the schedule and take the train orders of the disabled train, proceed to the next open telegraph office, and there report to the dispatcher. The disabled train will assume the schedule and take the train orders of the last train with which it has exchanged, and will when able proceed to and report from the next open telegraph office.

95. A train must not display signals for a

NOTE TO RULE 91 —The Committee recommends, that where greater clearance is necessary, Rule No. 91 should allow a clearance of TEN minutes or more.

following section, nor an extra train be run, without orders from the conductor.

96. When signals displayed for a section are taken down at any point before that section arrives, the conductor will, if there be no other provision, arrange with the operator, or if there be no operator, with the switch-tender, or in the absence of both, with a flagman left there for the purpose to notify all opposing trains of the same or inferior class leaving such point that the section for which the signals were displayed has not arrived.

97. Work extras will be assigned working limits.

98. Trains must approach the end of double track, junctions, railroad crossings at grade, and drawbridges, prepared to stop, unless the switches and signals are right and the track is clear. Where required by law, trains must stop.

99. When a train stops or is delayed, under circumstances in which it may be overtaken by another train, the flagman must go back immediately with stop signals a sufficient distance to insure full protection. When recalled he may return to his train, first placing two torpedoes on the rail when the conditions require it.

The front of a train must be protected in the same way, when necessary, by the flagman.

100. When the flagman goes back to pro-

tect the rear of his train, the Baggage Master must, in the case of passenger trains, and the next brakeman in the case of other trains, take his place on the train.

101. If a train should part while in motion, trainmen must, if possible, prevent damage to the detached portions. The signals prescribed by Rules 12 (*d*) and 14 (*f*) must be given, and the front portion of the train kept in motion until the detached portion is stopped.

The front portion will then go back, to recover the detached portion, running with caution and following a flagman. The detached portion must not be moved or passed until the front portion comes back.

102. When cars are pushed by an engine (except when shifting and making up trains in yards) a flagman must take a conspicuous position on the front of the leading car and signal the engineman in case of need.

103. Messages or orders respecting the movement of trains or the condition of track or bridges must be in writing.

104. Switches must be left in proper position after having been used. Conductors are responsible for the position of the switches used by them and their trainmen, except where switchtenders are stationed.

A switch must not be left open for a following train unless in charge of a trainman of such train.

105. Both conductors and enginemen are responsible for the safety of their trains and, under conditions not provided for by the rules, must take every precaution for their protection.

106. In all cases of doubt or uncertainty the safe course must be taken and no risks run.

Rules for Movement by Train Orders on Single Track Roads.

201. For movements not provided for by Time-table, train orders will be issued by authority and over the signature of the [illegible]. They must contain neither information nor instructions not essential to such movements.

They must be brief and clear; in the prescribed forms when applicable; and without erasure, alteration or interlineation.

202. Each train order must be given in the same words to all persons or trains addressed.

203. Train orders will be numbered consecutively each day, beginning with No. — at midnight.

204. Train orders must be addressed to those who are to execute them, naming the place at which each is to receive his copy. Those for a train must be addressed to the conductor and engineman, and also to any one who acts as its pilot. A copy for each person addressed must be supplied by the operator.

205. Each train order must be written in full in a book provided for the purpose at the office of the train dispatcher; and with it recorded the names of those who have signed for the order; the time and the signals which show when and from what offices the order was repeated and the responses transmitted; and the train dispatcher's initials. These records must be made at once, and never from memory or memoranda.

206. Regular trains will be designated in train orders by their numbers, as "No 10," or "2d No. 10," adding engine numbers if desired; extra trains by engine numbers, as "Extra 798," with the direction when necessary, as "East" or "West." Other numbers and time will be stated in figures only.

207. To transmit a train order, the signal "31" or the signal "19" must be given to each office addressed, the number of copies being stated, if more or less than three—thus, "31 copy 5," or "19 copy 2."

208. A train order to be sent to two or more offices must be transmitted simultaneously to as many of them as practicable. The several addresses must be in the order of superiority of trains, each office taking its proper address. When not sent simultaneously to all, the order must be sent first to the superior train.

209. Operators receiving train orders must

NOTE TO RULE 207.—Where forms "31" and "19" are not both in use the signal may be omitted.

write them in manifold during transmission and if they cannot at once writing make the requisite number of copies, must trace others from one of the copies first made.

210. When a "31" train order has been transmitted, operators must (unless otherwise directed) repeat it at once from the manifold copy in the succession in which the several offices have been addressed, and then write the time of repetition on the order. Each operator receiving the order should observe whether the others repeat correctly.

Those to whom the order is addressed, except enginemen, must then sign it, and the operator will send their signatures preceded by the number of the order to the Train Dispatcher. The response "complete," and the time, with the initials of the Train Dispatcher, will then be given by the train dispatcher. Each operator receiving this response will then write on each copy the word "complete," the time, and his last name in full, and then deliver a copy to each person addressed, except enginemen. The copy for each engineman must be delivered to him personally by Conductor

211. When a "19" train order has been transmitted, operators must (unless otherwise directed) repeat it at once from the manifold

NOTE TO RULE 210.—The blanks in the above rule may be filled for each road to suit its own requirements. On roads where the signature of the engineman is desired, the words "except enginemen" and the last sentence in the second paragraph may be omitted. If preferred, each person receiving an order may be required to read it aloud to the operator.

copy, in the succession in which the several offices have been addressed. Each operator receiving the order should observe whether the others repeat correctly. When the order has been repeated correctly by an operator, the responsee "complete," and the time, with the initials of the dispatcher, will be given by the train dispatcher. The operator receiving this response will then write on each copy the word "complete," the time, and his last name in full, and personally deliver a copy to each person addressed without taking his signature.

212. A train order may, when so directed by the train dispatcher, be acknowledged without repeating, by the operator responding: "X; (Number of Train Order) to (Train Number)," with the operator's initials and office signal. The operator must then write on the order his initials and the time.

213. "Complete" must not be given to a train order for deliver to an inferior train until the order has been repeated or the "X" response sent by the operator who receives the order for the superior train.

214. When a train order has been repeated or "X" response sent, and before "complete" has been given, the order must be treated as a holding order for the train addressed, but must not be otherwise acted on until "complete" has been given.

If the line fails before an office has repeated an order or has sent the "X" response, the

order at that office is of no effect and must be there treated as if it had not been sent.

215. The operator who receives and delivers a train order must preserve the lowest copy.

216. For train orders delivered by the train dispatcher the requirements as to the record and delivery are the same as at other offices.

Such orders shall be first written in manifold so as to leave an impression in the record book, from which transmission shall be made.

217. A train order to be delivered to a train at a point not a telegraph station, or at one at which the telegraph office is closed, must be addressed to

"*C. and E.* —— (*at* ——), *care of* ——,"

and forwarded and delivered by the conductor or other person in whose care it is addressed. When form 31 is used "complete" will be given upon the signature of the person by whom the order is to be delivered, who must be supplied with copies for the conductor and engineman addressed, and a copy upon which he shall take their signatures. This copy he must deliver to the first operator accessible, who must preserve it, and at once transmit the signatures of the conductor and engineman to the train dispatcher.

Orders so delivered must be acted on as if "complete" had been given in the usual way.

For orders which are sent, in the manner herein provided, to a train, the superiority of which is thereby restricted, "complete" must

not be given to an inferior train until the signatures of the conductor and engineman of the superior train have been sent to the dispatcher

218. When a train is named in a train order, all its sections are included unless particular sections are specifed, and each section included must have copies addressed and delivered to it.

219. Unless otherwise directed, an operator must not repeat or give the "X" response to a train order for a train, the engine of which has passed his train-order signal, until he has ascertained that the conductor and engineman have been notified that he has orders for them.

220. Train orders once in effect continue so until fulfilled, superseded or annulled. Any part of an order specifying a particular movement may be either superseded or annulled.

Orders held by or issued for a regular train become void when such train loses both right and class as prescribed by Rules 4 and 82, or is annulled.

221. (A). A fixed signal must be used at each train-order office, which shall indicate "stop" when there is an operator on duty, except when changed to "proceed" to allow a train to pass after getting train orders, or for which there are no orders. A train must not pass the signal while "stop" is indicated. The signal must be returned to "stop" as soon as a train has passed. It must be fastened at "proceed" only when no operator is on duty.

Operators must have the proper appliances for hand signaling ready for immediate use if the fixed signal should fail to work properly. If a signal is not displayed at a night office, trains which have not been notified must stop and ascertain the cause, and report the facts to the [illegible] from the next open telegraph office.

When the semaphore is used, the arm indicates "stop" when horizontal and "proceed" when in an inclined position.

221 (B). A fixed signal must be used at each train-order office, which shall indicate "stop" when trains are to be stopped for train orders. When there are no orders the signal must indicate "proceed."

When an operator receives the signal "31," or "19," he must immediately display the "stop signal" and then reply "stop displayed"; and until the orders have been delivered or annulled the signal must not be restored to "proceed." While "stop" is indicated trains must not proceed without a clearance card (Form —— (A)).

Operators must have the proper appliances for hand signaling ready for immediate use if

NOTE TO RULE 221 (A).—The conditions which affect trains at stations vary so much that it is recommended each road adopt such regulations supplementary to this rule as may best meet its own requirements.

NOTE TO RULE 221 (A) AND 221 (B).—The Committee has recommended two forms of Rule 221, leaving it discretionary to adopt one or both of these forms according to the circumstances of the traffic.

the fixed signal should fail to work properly. If a signal is not displayed at a night office, trains which have not been notified must stop and ascertain the cause, and report the facts to the Supt. from the next open telegraph office.

Where the semaphore is used, the arm indicates "stop" when horizontal and "proceed" when in an inclined position.

222. Operators will promptly record and report to the Dispatcher the time of departure of all trains and the direction of extra trains. They will record the time of arrival of trains and report it when so directed.

223. The following signs and abbreviations may be used:

Initials for signature of the Dispatcher

Such office and other signals as are arranged by the Supt.

C & E—for Conductor and Engineman.

X—Train will be held until order is made "complete."

Com—for Complete.

O S—Train Report.

No—for Number.

Eng—for Engine.

Sec—for Section.

Psgr—For Passenger.

Frt—for Freight.

Mins—for Minutes.

Jct—for Junction.

Dispr—for Train Dispatcher.

Opr—for Operator.

31 or 19—to clear the line for Train Orders, and for Operators to ask for Train Orders.

S D—for "Stop Displayed."

The usual abbreviations for the names of the months and stations.

Forms of Train Orders for Single Track Roads.

FORM A. FIXING MEETING POINTS FOR OPPOSING TRAINS.

(1.) ——— will meet ——— at ———.

(2.) ——— will meet ——— at ——— ——— at ——— (and so on).

EXAMPLES.

(1.) *No 1 will meet No 2 at Bombay.*

No 3 will meet 2d No 4 at Siam.

No 5 will meet Extra 95 at Hong Kong.

Extra 652 North will meet Extra 231 South at Yokahama.

(2.) *No 1 will meet No 2 at Bombay 2d No 4 at Siam and Extra 95 at Hong Kong.*

GENERAL NOTE.—Blanks in the rules may be filled by each road to suit its own organization or requirements.

Trains receiving these orders will run with respect to each other to the designated points and there meet in the manner provided by the Rules.

FORM B. DIRECTING A TRAIN TO PASS OR RUN AHEAD OF ANOTHER TRAIN.

(1.) ——— will pass ——— at ———.

(2.) ——— will pass ——— when overtaken.

(3.) ——— will run ahead of ——— ——— to ———.

(4.) ——— will pass ———at ——— and run ahead of ——— ——— to ———.

EXAMPLES.

(1.) *No 1 will pass No 3 at Khartoum.*

(2.) *No 6 will pass No 4 when overtaken.*

(3.) *Extra 594 will run ahead of No 6 Bengal to Madras.*

(4.) *No 1 will pass No 3 at Khartoum and run ahead of No 7 Madras to Bengal.*

When under (1) a train is to pass another both trains will run according to rule to the designated point and there arrange for the rear train to pass promptly.

Under (2), both trains will run according to rule until the second-named train is overtaken and then arrange for the rear train to pass promptly.

Under (3), the second-named train must not exceed the speed of the first-named train between the points designated.

FORM C. GIVING A TRAIN THE RIGHT OVER AN OPPOSING TRAIN.

——— has right over ——— ——— to ———.

EXAMPLES.

(1.) *No 1 has right over No 2 Mecca to Mirbat.*

(2.) *Extra 37 has right over No 3 Natal to Ratlam.*

This order gives the train first named the right over the other train between the points named.

If the trains meet at either of the designated points, the first-named train must take the siding, unless the order otherwise prescribes.

Under (1), if the second-named train reaches the point last named before the other arrives it may proceed, keeping clear of the opposing train as many minutes as such train was before required to clear it under the Rules.

If the second-named train, before meeting, reaches a point within or beyond the limits named in the order, the conductor must stop the other train where it is met and inform it of his arrival.

Under (2), the regular train must not go beyond the point last named until the extra train has arrived.

When the extra train has reached the point last named the order is fulfilled.

The following modification of this form of order will be applicable for giving a work

extra the right over all trains in case of emergency:

(3.) Work extra ——— has right over all trains between ——— and ——— from ——— m to ———m.

EXAMPLE.

Work extra 275 has right over all trains between Stockholm and Edinburg from 7 p m to 12 midnight.

This gives the work extra the exclusive right between the points designated between the times named.

FORM D. GIVING REGULAR TRAINS THE RIGHT OVER A GIVEN TRAIN.

Regular trains have right over ——— between ——— and ———.

EXAMPLE.

Regular trains have right over No 1 between Moscow and Berlin.

This order gives to regular trains receiving it the right over the train named in the order, and the latter must clear the schedule times of all regular trains, as if it were an extra.

FORM E. TIME ORDERS.

(1.) ——— will run ——— late ——— to ———.

(2.) ——— will run ——— late ——— to ——— and ——— late ——— to ——— etc.

(3.) ——— will wait at ——— until ——— for ———.

EXAMPLES.

(1.) *No 1 will run 20 min late Joppa to Mainz.*

(2.) *No 1 will run 20 min late Joppa to Mainz and 15 min late Mainz to Muscat etc.*

(3.) *No 1 will wait at Muscat until 10 a m for No 2.*

(1) and (2) make the schedule time of the train named, between the stations mentioned, as much later as stated in the order, and any other train receiving the order is required to run with respect to this later time, as before required to run with respect to the regular schedule time. The time in the order should be such as can be easily added to the schedule time.

Under (3) the train first named must not pass the designated station before the time given, unless the other train has arrived. The train last named is required to run with respect to the time specified, as before required to run with respect to the regular schedule time of the train first named.

FORM F. FOR SECTIONS.

——— will display signals ——— to ——— for ———.

EXAMPLES.

Eng 20 will display signals and run as 1st No 1 London to Paris.

No 1 will display signals London to Dover for Eng 85.

2d No 1 will display signals London to Dover for Eng 90.

This form may be modified as follows:

Engs 70 85 and 90 will run as 1st 2d and 3d No 1.

Engs 70 85 and 90 will run as 1st 2d and 3d No 1 London to Dover.

Under these examples the engine last named will not display signals.

For annulling a section:

Eng 85 is annulled as 2d No 1 from Chatham.

If there are other sections following add:

Following sections will change numbers accordingly.

The character of a train for which signals are displayed may be stated. Each section affected by the order must have copies, and must arrange signals accordingly.

FORM G. EXTRA TRAINS.

(1.) Eng ——— will run extra ——— to ———.

(2.) Eng ——— will run extra ——— to ——— and return to ———.

EXAMPLES.

(1.) *Eng 99 will run extra Berber to Gaza.*

(2.) *Eng 99 will run extra Berber to Gaza and return to Cabul.*

A train receiving this order is not required to protect itself against opposing extra trains, unless directed by order to do so, but must

keep clear of all regular trains, as required by rule.

(3.) Eng ——— will run extra leaving ——— on ——— as follows with right over all trains.

Leave ———.
Leave ———.
Arrive ———.

EXAMPLE.

(3.) Eng 77 will run extra leaving Turin on Thursday Feb 17th as follows with right over all trains.

Leave Turin 11 30 p m
Leave Pekin 12 25 a m
Leave Canton 1 47 a m
Arrive Rome 2 22 a m

This order may be varied by specifying the kind of extra and the particular trains over which the extra shall or shall not have the right. Trains over which the extra is thus given the right must clear the time of the extra ——— minutes.

FORM H. WORK EXTRA.

(1.) Work extra ——— will work ——— until ——— between ——— and ———.

EXAMPLES.

(1.) Work extra 292 will work 7 a m until 6 p m between Berne and Turin.

The working limits should be as short as practicable, to be changed as the progress of the work may require. The above may be combined, thus:

(*a.*) *Work extra 292 will run Berne to Turin and work 7 a m until 6 p m between Turin and Rome.*

When an order has been given to "work" between designated points, no other extra shall be authorized to run over that part of the track without provision for passing the work extra.

When it is anticipated that a work extra may be where it cannot be reached for orders, it may be directed to report for orders at a given time and place, or an order may be given that it shall clear the track for (or protect itself after a certain hour against) a designated extra by adding to (1) the following words:

(*b.*) *And will keep clear of (or protect against) Extra 223 south between Antwerp and Brussels after 2 10 p m.*

In this case, extra 223 must not pass the northernmost point before 2.10 p. m., at which time the work extra must be out of the way, or protected (as the order may require) between those points.

When the movement of an extra over the working limits cannot be anticipated by these or other orders to the work extra, an order must be given to such extra, to protect itself against the work extra, in the following form:

(*c.*) *Extra 76 will protect against work extra 95 between Lyons and Paris.*

This may be added to the order to run extra.

A work extra when met or overtaken by an extra must allow it to pass.

When it is desirable that a work extra shall at all times protect itself while on working limits, it may be done by adding to (1) the following words:

(*d.*) *protecting itself.*

A train receiving this order must, whether standing or moving, protect itself within the working limits in both directions in the manner prescribed by Rule 99.

Whenever an extra is given orders to run over working limits it must at the same time be given a copy of the order sent to the work extra.

To enable a work extra to work upon the time of a regular train, the following form may be used:

(*e.*) *Work extra 292 will protect against No 55 between Berne and Turin.*

A train receiving this order will work upon the time of the train mentioned in the order, and protect itself against it as prescribed by Rule 99.

The regular train receiving this order must run, expecting to find the work extra protecting itself within the limits named.

FORM J. HOLDING ORDER.

Hold ——— at ———.

EXAMPLES.

(*1.*) *Hold No 2 at Berlin.*

(*2.*) *Hold all eastbound trains at Berlin.*

This order will be addressed to the operator and acknowledged in the usual manner. It must be respected by conductors and enginemen of trains thereby directed to be held as if addressed to them.

When a train has been so held it must not proceed until the order to hold is annulled, or an order given to the operator in the form:

"——— *may go.*"

Form J will only be used when necessary to hold trains until orders can be given, or in case of emergency.

FORM K. ANNULLING A REGULAR TRAIN.

(1.) ——— of ——— is annulled ——— to ———.

(2.) ——— due to leave ——— ——— is annulled ——— to ———.

EXAMPLES.

(*1.*) *No 1 of Feb 29th is annulled Alaska to Halifax.*

(*2.*) *No 3 due to leave Naples Saturday Feb 29th is annulled Alaska to Halifax.*

The train annulled loses both right and class between the stations named and must not be restored under its original number between those stations.

FORM L. ANNULLING AN ORDER.

"Order No ——— is annulled."

If an order which is to be annulled has not been delivered to a train, the annulling order will be addressed to the operator, who will

destroy all copies of the order annulled but his own, and write on that:

Annulled by Order No ———.

EXAMPLES.

Order No 10 is annulled.

An order which his been annulled must not be reissued under its original number.

In the address of an order annulling another order, the train first named must be that to which right was given by the order annulled, and when the order is not transmitted simultaneously to all concerned, it must be first sent to the point at which that train is to receive it and the required response made, before the order is sent for other trains.

FORM M. ANNULLING PART OF AN ORDER.

That part of Order No ——— reading ——— is annulled.

That part of Order No 10 reading No 1 will meet No 2 at Sparta is annulled.

In the address of an order annulling a part of an order, the train first named must be that to which right was given by the part annulled, and when the order is not transmitted simultaneously to all concerned, it must be first sent to the point at which that train is to receive it, and the required response made, before the order is sent for other trains.

FORM P. SUPERSEDING AN ORDER OR PART OF AN ORDER.

This order will be given by adding to prescribed forms the words "instead of ———."

(1.) ———will meet ——— at ——— instead of ———.

(2.) ——— has right over ——— ——— to ———instead of ———.

(3.) ——— will display signals for ——— ——— to ——— instead of ———.

EXAMPLES.

(1.) *No 1 will meet No 2 at Hong Kong instead of Bombay.*

(2.) *No 1 has right over No 2 Mecca to Medina instead of Mirbat.*

(3.) *No 1 will display signals for Eng 85 Astrakhan to Teheran instead of Cabul.*

An order which has been superseded must not be reissued under its original number.

SELECTIONS FROM THE

STANDARD CODE OF TRAIN RULES FOR DOUBLE TRACK

Embracing such Rules and Train Order Forms as materially differ from the Rules for Single Track or are applicable only to Double Track.

Classification of Trains.

D-81. Trains of the first class are superior to those of the second; trains of the second class are superior to those of the third; and so on. Extra trains are inferior to regular trains.

D-82. Regular trains twelve hours behind their schedule time lose both right and class, and can thereafter proceed only by train order.

NOTE—Numbers of Rules and designation of Train Order Forms correspond with those of the Standard Code of Train Rules for Single Track except that the prefix "*D*" is used.

Movement of Trains.

D-83. A train must not leave its initial station on any division, or a junction, until it has been ascertained whether all superior trains due have left.

D-84. A train leaving its initial station on each division, or leaving a junction, when a train of the same class is overdue, will proceed on its schedule, and the overdue train will run as prescribed by Rule *D*-91.

D-85. A train must not start until the proper signal is given.

D-86. An inferior train must keep out of the way of a superior train, and clear its time at least five minutes.

D-87. A train failing to clear the main track by the time required by rule, must be protected as prescribed by Rule *D*-99.

88. Omitted. (Not applicable to Double Track.)

89. Omitted. (Included in Rule *D*-86.)

90. Omitted. (Not applicable to Double Track.)

D-91. Unless some form of block signals is used, trains must keep at least five minutes apart, except in closing up at stations.

NOTE TO RULE *D*-86.—The Committee recommends, that where greater clearance is necessary, Rule *D*-86 should require a clearance of TEN minutes.

NOTE TO RULE *D*-91.—The Committee recommends, that where greater clearance is necessary, Rule *D*-91 should allow a clearance of TEN minutes or more.

D-92. A train must not arrive at a station in advance of its schedule arriving time.

A train must not leave a station in advance of its schedule leaving time.

D-93. A regular train which is delayed, and falls back on the time of another train of the same class, will proceed on its own schedule.

A regular train may pass and run ahead of a train of the same class or its sections.

A sections may pass and run ahead of another section of the same train first exchanging orders, signals and numbers with the section to be passed.

An extra train may pass and run ahead of extra and ——— class trains or their sections.

D-94. A train which overtakes a superior train, so disabled that it cannot proceed will pass it, if practicable, and if necessary will assume the schedule and take the train orders of the disabled train, proceed to the next open telegraph office, and there report to the ———. The disabled train will assume the schedule and take the train orders of the last train with which it has exchanged and will, when able, proceed to and report from the next open telegraph office.

D-95. A train must not display signals for a following section, except as prescribed by Rule *D*-93, nor an extra train be run, without orders from the ———.

96. Omitted. (Not applicable to Double track.)

D-97. Work extras will be assigned working limits. Within these limits such trains must move with the current of traffic unless train orders otherwise direct.

D-98. Trains must approach the end of double track, junctions, railroad crossings at grade, and drawbridges, prepared to stop, unless the switches and signals are right and the track is clear. Where required by law, trains must stop.

D-99. When a train stops or is delayed, under circumstances in which it may be overtaken by another train, the flagman must go back immediately with stop signals a sufficient distance to insure full protection. When recalled he may return to his train, first placing two torpedoes on the rail when the conditions require it.

The front of a train must be protected in the same way, when necessary, by the ———.

D-100. When the flagman goes back to protect the rear of his train, the ——— must, in the case of passenger trains, and the next brakeman in the case of other trains, take his place on the train.

D-101. If a train should part while in motion, trainmen must, if possible, prevent damage to the detached portions. The signals prescribed by Rules *D*-12 (*d*) and *D*-14 (*f*) must be given, and the front portion of the train kept in motion until the detached portion is stopped.

The front portion will then go back, to recover the detached portion, running with caution and following a flagman. The detached portion must not be moved or passed until the front portion comes back.

The front portion must give the train-parted signal to trains running in the opposite direction. A train receiving this signal from a train on the opposite track must stop and then proceed with caution until the detached portion of the train has been passed. When a train breaks down so it may obstruct the opposite track, trains on the opposite track must be stopped.

D-102. When cars are pushed by an engine (except when shifting and making up trains in yards) a flagman must take a conspicuous position on the front of the leading car and signal the engineman in case of need.

D-103. Messages or orders respecting the movement of trains or the condition of track or bridges must be in writing.

D-104. Switches must be left in proper position after having been used. Conductors are responsible for the position of the switches used by them and their trainmen, except where switchtenders are stationed.

A switch must not be left open for a following train unless in charge of a trainman of such train.

D-105. Both conductors and enginemen are responsible for the safety of their trains and,

under conditions not provided for by the rules, must take every precaution for their protection.

D-106. In all cases of doubt or uncertainty the safe course must be taken and no risks run.

D-151. Trains must keep to the ———, unless otherwise provided.

D-152. When a train crosses over to, or obstructs the other track, unless otherwise provided it must first be protected as prescribed by Rule *D*-99 in both directions on that track.

D-153. Trains must use caution in passing a train receiving or discharging passengers at a station, and must not pass between it and the platform at which the passengers are being received or discharged.

DOUBLE TRACK FORMS OF TRAIN ORDERS,

WHICH DIFFER FROM SINGLE TRACK FORMS.

D-FORM E. TIME ORDERS.

(1.) ——— will run ——— late ——— to ———.

(2.) ——— will run ——— late ——— to ——— and ——— late ——— to ———, etc.

EXAMPLES.

(1.) *No 1 will run 20 min late Joppa to Mainz.*

(2.) *No 1 will run 20 min late Joppa to Mainz and 15 min late Mainz to Muscat, etc.*

NOTE—Forms *A*, *C* and *D* are not applicable to double track. Forms *B*, *F*, *G*, *J*, *K*, *L* and *M* are the same on single and double track.

(1) and (2) make the schedule time of the train named, between the stations mentioned, as much later as stated in the order, and any other train receiving the order is required to run with respect to this later time, as before required to run with respect to the regular schedule time. The time in the order should be such as can be easily added to the schedule time.

D-FORM H. WORK EXTRA.

Eng ——— will work extra ——— until ——— between ——— and ———.

EXAMPLE.

Eng 292 will work extra 7 a m until 6 p m between Berne and Turin.

This form of order must be combined with one of the following additions:

(1.) *"On (eastward) track."*
"On (westward) track."
"On (eastward and westward) track."

Under (1) the Work extra will protect on the track or tracks named as prescribed by Rule *D*-99. The time of regular trains must be cleared.

(2.) *"On (eastward) track without protecting against extra trains."*
"On (westward) track without protecting against extra trains."
"On (eastward and westward) track without protecting against extra trains."

Under (2) protection against extra trains

will not be required. The time of regular trains must be cleared.

(3.) *"Protecting against (No 1) or all regular trains."*

Under (3) the Work extra can work upon the time of the train or trains named in the order, and must protect against such train or trains as prescribed by Rule *D*-99.

(4.) *"Protection against trains moving against the current of traffic on ——— track."*

Under (4) protection must be given against trains which may be moving against the current of traffic on the track or tracks named.

D-FORM P. SUPERSEDING AN ORDER OR A PART OF AN ORDER.

This order will be given by adding to prescribed forms, the words "instead of ———."

(1.) ——— will pass ——— at ——— instead of ———.

(2.) ——— will display signals for ——— ——— to ——— instead of ———.

EXAMPLES.

(1.) *No 1 will pass No 3 at Medina instead of Khartoum.*

(2.) *No 1 will display signals for Eng 85 Astrakhan to Teheran instead of Cabul.*

An order which has been superseded must not be reissued under its original number.

D-FORM R. PROVIDING FOR A MOVEMENT AGAINST THE CURRENT OF TRAFFIC.

——— has right over opposing trains on ——— track ——— to ———.

EXAMPLE.

(1.) *No 1 has right over opposing trains on No 2 (or eastward) track Mecca to Mirbat.*

A train must not be moved against the current of traffic until the track on which it is to run has been cleared of opposing trains.

Under this order the first named train must use the track specified between the two points named and has the right over opposing trains on that track between those points. Opposing trains must not leave the point last named until the first named train arrives.

An inferior train between the points named moving with the current of traffic in the same direction as the first named train must receive a copy of the order, and may then proceed on its schedule, or right.

This order may be modified as follows:

(2.) After ——— arrives at ——— ——— has right over opposing trains on ——— track ——— to ———.

EXAMPLE.

After No 4 arrives at Mecca No 1 has right over opposing trains on No 2 (or eastward) track Mecca to Mirbat.

Under (2) the train to be moved against the current of traffic must not leave the first named point until the arrival of the first named train.

D-FORM S. PROVIDING FOR THE USE OF A SECTION OF DOUBLE TRACK AS SINGLE TRACK.

——— track will be used as single track between ——— and ———.

If it is desired to limit the time for such use add (from ——— until ———).

EXAMPLE.

No 1 (or westward) track will be used as single track between Mecca and Mirbat.

Adding if desired

from 1 p m until 3 p m.

Under this order all trains must use the track specified between the stations named and will be governed by rules for single track.

Trains running against the current of traffic on the track named must be clear of the track at the expiration of the time named, or protected as prescribed by Rule *D*-99.

Dividing Points--Standard Time Sections.

Between Central and Mountain Sections.

ALLIANCE, NEB.

(*Mountain time is used locally.*)

Central time—Burlington & Missouri River in Nebraska (East of Alliance).

Mountain time—Burlington & Missouri River in Nebraska (West of Alliance).

BRANDON, MAN.

(*Central time is used locally.*)

Central time—Canadian Pac. (East of Brandon). Northern Pacific.

Mountain time—Can. Pac. (West of Brandon).

CHEYENNE WELLS, COLO.

(*Central time is used locally.*)

Central time—Union Pacific, Kansas Div. (East of Cheyenne Wells).

Mountain time—Union Pacific, Colorado Div. (West of Cheyenne Wells).

DODGE CITY, KAN.

(*The city uses Central time.*)

Central time—Atchison, Topeka & Santa Fe (East of Dodge City). Chicago, Rock Island & Pacific.

Mountain time—Atchison, Topeka & Santa Fe (West of Dodge City).

EL PASO, TEX.

(*Mountain time is used locally.*)

Central time—Galveston, Harrisburg & San Ant. Texas & Pacific.

Mountain time—Atchison, Topeka & Santa Fe. El Paso & North-eastern.

Pacific time—Southern Pacific (Pacific System).

City of Mexico time—Mexican Central.

HOLYOKE, COLO.

(*Central time is used locally.*)

Central time—Burlington & Missouri River (East of Holyoke).

Mountain time—Burlington & Missouri River (West of Holyoke).

HOISINGTON, KAN.

(*Central time is used locally.*)

Central time—Missouri Pacific (East of Hoisington).

Mountain time—Missouri Pacific (West of Hoisington).

LONG PINE, NEB.

(*Central time is used locally.*)

Central time—Fremont, Elkhorn & Missouri Valley (East of Long Pine).

Mountain time—Fremont, Elkhorn & Missouri Valley (West of Long Pine).

MANDAN, N. D.

(*Mountain time is used locally.*)

Central time—North. Pacific (East of Mandan).

Mountain time—North. Pacific (West of Mandan).

McCOOK, NEB.

(*Mountain time is used locally.*)

Central time—Burlington & Missouri River (East of McCook).

Mountain time—Burlington & Missouri River (West of McCook).

MINOT, N. D.

(*Central time is used locally.*)

Central time—Great Northern (East of Minot). Minnesota, St. Paul & Sault Ste. Marie.

Mountain time—Gt. Northern (West of Minot).

NORTH PLATTE, NEB.

(*Central time is used locally.*)

Central time—Union Pac. (East of North Platte).

Mountain time—Union Pac. (West of North Platte).

OAKLEY, KAN.

(*Mountain time is used locally.*)

Central time—Union Pacific (Lincoln & Col. Branch).

Mountain time—Union Pacific (Main Line, Kansas Div.).

PORTAL, N. D.

(*Central time is used locally.*)

Central time—Minn. St. Paul & Sault Ste. Marie.

Mountain time—Canadian Pacific.

PHILLIPSBURG, KAN.

(*Central time is used locally.*)

Central time—Chicago, Rock Island & Pacific (East of Phillipsburg).

Mountain time—Chicago, Rock Island & Pacific (West of Phillipsburg).

SANTA ROSA, N. M.

(*Central time is used locally.*)

Central time—Chicago, Rock Island & El Paso Ry.

Mountain time—El Paso & Rock Island Ry.

TEXLINE, TEX.

(*Mountain time is used locally.*)

Central time—Fort Worth & Denver City.

Mountain time—Colorado & Southern.

Between Mountain and Pacific Sections.

DEMING, N. M.

(*Mountain time is used locally.*)

Mountain time—Atchison, Topeka & Santa Fe.

Pacific time—Southern Pacific.

HUNTINGTON, ORE.

(*Pacific time is used locally.*)

Mountain time—Oregon Short line.

Pacific time—Oregon R. R. & Navigation Co.

LAGGAN, BRITISH COLUMBIA.

(*Pacific time is used locally.*)

Mountain time—Can. Pacific (East of Laggan).

Pacific time—Can. Pacific (West of Laggan).

OGDEN, UTAH.

(*Mountain time is used locally.*)

Mountain time—Oregon Short line.

Rio Grande Western.
Union Pacific.
Pacific time—Southern Pacific.

SELIGMAN, ARIZ.

(*Mountain time is used locally.*)
Mountain time—Santa Fe Route (East of Seligman).
Pacific time—Santa Fe Route (West of Seligman).

SPOKANE, WASH.

(*Pacific time is used locally.*)
Mountain time—Northern Pacific (East of Spokane).
Pacific time—Great Northern.
Northern Pacific (West of Spokane).

TROY, MONT.

(*Mountain time is used locally.*)
Mountain time—Great Northern (East of Troy).
Pacific time—Great Northern (West of Troy).

Between Eastern and Central Sections.

ASHEVILLE, N. C.

(*Eastern time is used locally.*)
Eastern time—Southern (except Asheville and Morristown Line).
Central time—Southern (Asheville and Morristown Line).

ATHENS, GA.

(*The city uses Central time.*)
Eastern time—Southern.
Seaboard Air Line.
Central time—Georgia.
Central of Georgia.

ATLANTA, GA.

(*The city uses Central time.*)

Eastern time—Seaboard Air Line.
Southern, Main Line (East of Atlanta).
Central time—Atlanta & West Point.
Central of Georgia.
Georgia.
Southern (West and South of Atlanta).
Western & Atlantic.

AUGUSTA, GA.

(*The city uses Eastern time.*)

Eastern time—Atlantic Coast Line.
Charleston & Western Carolina.
Southern.
Central time—Central of Georgia.
Georgia.

BENWOOD, W. VA.

(*Eastern time is used locally.*)

Eastern time—Balt. & Ohio (East of Benwood).
Central time—Balt. & Ohio (West of Benwood).

BRISTOL, TENN.

(*Eastern time is used locally.*)

Eastern time—Norfolk & Western.
Virginia & South-western.
Central time—Southern.

BUFFALO, N. Y.

(*The city uses Eastern time.*)

Eastern time—Buffalo, Rochester & Pittsburgh.
Delaware, Lackawanna & Western.
Erie.
Grand Trunk

Lehigh Valley.
New York Central & Hudson River.
Pennsylvania.
Wabash.
West Shore.

Central time—Lake Shore & Michigan Southern.
Michigan Central.
New York, Chicago & St. Louis.

BUTLER, PA.

(*Eastern time is used locally.*)

Eastern time—Buffalo, Rochester & Pittsburgh.
Pennsylvania.
Pittsburgh & Western.

Central time—Bessemer & Lake Erie.

CARTIER, ONT.

(*Central time is used locally.*)

Eastern time—Canadian Pac. (East of Cartier).

Central time—Canadian Pac. (West of Cartier).

CENTRAL JUNCTION, GA.

Eastern time—Atlantic Coast Line (North of Junction).

Central time—Atlantic Coast Line (South of Junction).

CLIFTON FORGE, VA.

(*See also West Clifton Forge.*)
(*Eastern time is used locally.*)

Eastern time—Chesapeake & Ohio (East of Clifton Forge).

Central time—Chesapeake & Ohio (West of Clifton Forge).

COLUMBIA, S. C.

(*Eastern time is used locally.*)

Eastern time—Atlantic Coast Line.
Columbus, Newberry & Laurens.
Seaboard Air Line (North of Columbia).
Southern.

Central time—Seaboard Air Line (South of Columbia).

CORRY, PA.

Eastern time—Pennsylvania.

Central time—Erie.

DETROIT, MICH.

(*See Windsor.*)

(*Central time is legal time for the State of Michigan, but local time, twenty-eight minutes faster than Central time, is also used in the city of Detroit.*)

Eastern time—Canadian Pacific.
Grand Trunk (in Canada).

Central time—Grand Trunk (in Michigan).
Lake Shore & Michigan Southern.
Michigan Central.
Pere Marquette.
Wabash.

DUNKIRK, N. Y.

(*The city uses Eastern time.*)

Eastern time—Erie.
Pennsylvania.

Central time—Dunkirk, Allegheny Valley & Pittsburg.
Lake Shore & Michigan Southern.
New York, Chicago & St. Louis.

ERIE, PA.

(*The city uses Eastern time.*)

Eastern time—Pennsylvania (P. & E. Div.)

Central time—Pennsylvania Co.
Lake Shore & Michigan Southern.
New York, Chicago & St. Louis.
Bessemer & Lake Erie.

FRANKLIN, PA.

(*Eastern time is used locally.*)

Eastern Time—Pennsylvania.

Central time—Erie.
Lake Shore & Michigan Southern.

GAINESVILLE, GA.

(*The city uses mean local time.*)

Eastern time—Southern.

Central time—Georgia.

JAMESTOWN, N. Y.

(*Eastern time is used locally.*)

Eastern time—Erie (B. & S. W. Div.).
Jamestown & Chautauqua.

Central time—Erie (Main Line).

KENOVA, W. VA.

(*Central time is used locally.*)

Eastern time—Baltimore & Ohio.

Central time—Chesapeake & Ohio.
Norfolk & Western.

NEW CASTLE JUNCTION, PA.

Eastern time—Pittsburgh & Western (East of New Castle Junction).

Central time—Pittsburgh & Western (West of New Castle Junction).

OIL CITY, PA.

(*Eastern time is used locally.*)

Eastern time—Pennsylvania.

Central time—Erie.

Lake Shore & Michigan Southern.

PARKERSBURG, W. VA.

(*The city uses Eastern time.*)

Eastern time—Baltimore & Ohio.

Central time—Baltimore & Ohio Southwestern

PITTSBURG, PA.

(*The city uses Eastern time.*)

Eastern time—Baltimore & Ohio.

Buffalo, Rochester & Pittsburgh.

Pennsylvania.

Pittsburg & Castle Shannon.

Pittsburgh & Western.

Central time—Pennsylvania Co.

Pittsburgh, Chartiers & Youghiogheny

Pittsburgh & Lake Erie.

Pittsburgh, Cincinnati, Chicago & St Louis.

PORT HURON, MICH.

(*The city uses Central time.*)

Eastern time—Grand Trunk (in Canada).

Central time—Grand Trunk (in Michigan).

Pere Marquette.

ST. THOMAS, ONT.

(*The city uses Eastern time.*)

Eastern time—Canadian Pacific.

Grand Trunk.

Central time—Michigan Central.

SALAMANCA, N. Y.

(*Eastern time is used locally.*)

Eastern time—Buffalo, Rochester & Pittsburgh.
Erie (East of Salamanca).
Pennsylvania.

Central time—Erie (West of Salamanca).

SARNIA, ONT.

(*See Port Huron.*)

(*The city uses Eastern time.*)

SAULT STE. MARIE, MICH.

(*Central time is used locally.*)

Central time—Duluth, South Shore & Atlantic.
Minneapolis, St. Paul & Sault Ste. Marie.

SAULT STE. MARIE, ONT.

(*Eastern time is used locally.*)

Eastern time—Algoma Central & Hudson Bay.
Canadian Pacific.

TITUSVILLE, PA.

(*Eastern time is used locally.*)

Eastern time—Pennsylvania.

Central time—Dunkirk, Allegheny Valley & Pittsburgh R. R.

UNION CITY, PA.

(*Eastern time is used locally.*)

Eastern time—Pennsylvania.

Central time—Erie.

WASHINGTON, (Washington Co.), PA.

(*The city uses Eastern time.*)

Eastern time—Baltimore & Ohio.

Central time—Pennsylvania Co.
Pittsburgh, Cincinnati, Chicago & St Louis.
Waynesburg & Washington.

WEST CLIFTON FORGE, VA.

(*See also Clifton Forge.*)

(*Eastern time is used locally.*)

Eastern time—Chesapeake & Ohio (East of West Clifton Forge).

Central time—Chesapeake & Ohio (West of West Clifton Forge).

WESTFIELD, N. Y.

Eastern time—Jamestown, Chautauqua & Lake Erie.

Central time—Lake Shore & Mich. Southern.

WHEELING, W. VA.

(*The city uses Eastern time.*)

Eastern time—Baltimore & Ohio.

Central time—Cleveland, Lorain & Wheeling.
Pittsburgh, Cincinnati, Chicago & St. Louis.
Wheeling & Lake Erie.

WILLIAMSON, W. VA.

(*Central time is used locally.*)

Eastern time—Norfolk & Western (East of Williamson).

Central time—Norfolk & Western (West of Williamson).

WINDSOR, ONT.

(*See Detroit.*)

Eastern time—Canadian Pacific.
Grand Trunk (in Canada).

Central time—Michigan Central.

Between Atlantic or Inter-Colonial and Eastern Sections.

CAMPBELLTON, N. B.

Atlantic time—Intercolonial Ry. (East of Campbellton).

Eastern time—Intercolonial Ry. (West of Campbellton).

VANCEBORO, ME.

Atlantic time—Canadian Pacific Ry. (East of Vanceboro).

Eastern time—Canadian Pacific Ry. (West of Vanceboro).

Maine Central Ry.

Forms of Blanks

for

Single and Double Track

Roads.

FORM — (A).

(NAME.) COMPANY.

CLEARANCE CARD.

Dover 9 15 A M March 25 19 09

Conductor and Engineman No 19

I have no (further) orders for your train.

Signal is out for Extra 467

This does not interfere with or countermand any orders you may have received.

John Jones
Operator.

Conductor and Engineman must each have a copy, and see that their train is correctly designated in the above form.

Standard Train Order Blank for 31 Order.

FORM 31 | FORM 31

(NAME) **COMPANY.**

TRAIN ORDER No. 10

March 27 19 02

To ..... At .....

X ..... (Initials.) ..... Opr.; ..... 1.45 A M

....

Conductor and Engineman must each have a copy of this order.

Repeated at 2 20 A M.

Conductor	Engineman	Train	Made	Time	Opr.
Jones	Brown	45	Complete	2 20 a.m.	Black
	(Omit				
	this column				
	where				
	Engineman				
	is not				
	required				
	to sign.)				

Standard Train Order Blank for 19 Order.

FORM 19 | FORM 19

(NAME.) COMPANY.

TRAIN ORDER No. 19

March 27 /9 02

To ..... | At .....

X ..... (INITIALS.) ..... Opr.; ..... 1 45 A M

....

Conductor and Engineman must each have a copy of this order.

Made Complete time 2 16 P M. Block Opr.

Diagrams

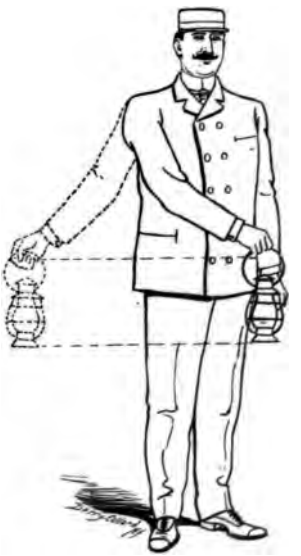
of

Hand, Flag and Lamp Signals.

Adopted April 24, 1901.

NOTE.

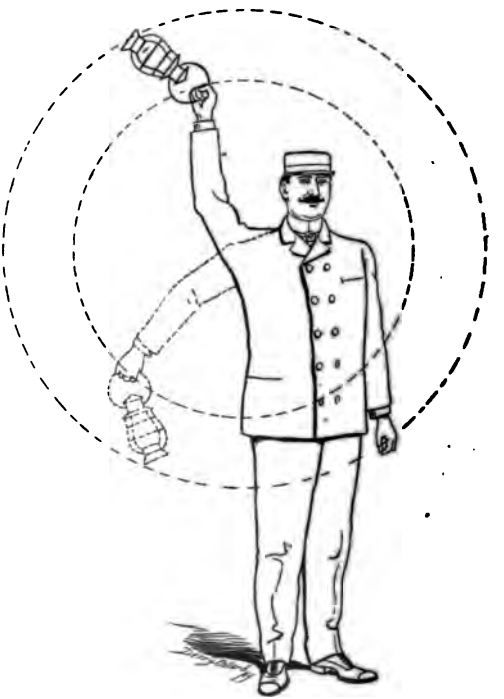
The hand, or a flag, moved the same as the lamp, as illustrated in the following diagrams, gives the same indication.



STOP—Swung across the Track. See Rules 12 (*a*) and D—12 (*a*).

PROCEED—Raised and lowered **vertically. See** Rules 12 (*b*) and D—12 (*b*).

BACK—Swung vertically in a circle across the track. See Rules 12 (*c*) 14 (*h*), D—12 (*c*) and D—14 (*h*),



TRAIN HAS PARTED—Swung **vertically in a** circle at arms length across **the track. See** Rules 12 (*d*), 14 (*f*), D—12 (*d*) **and D—14 (*f*).**

APPLY AIR BRAKES—Swung horizontally in a circle. See Rules 12 (*e*) and D—12 (*e*).

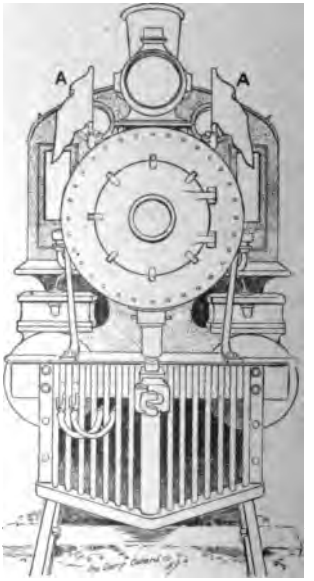
RELEASE AIR BRAKES—Held **at arm's length** above the head. See Rules **12 (*f*) and** D—12 (*f*),

Diagrams

of

Train Signals.

Adopted April 24, 1901.

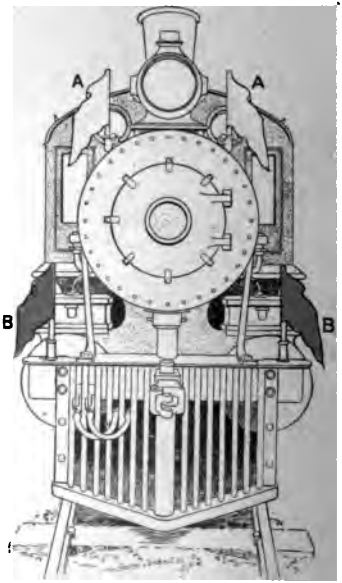


ENGINE RUNNING FORWARD BY DAY AS AN EXTRA TRAIN.

White flags at A A. See Rules 21 and D—21.

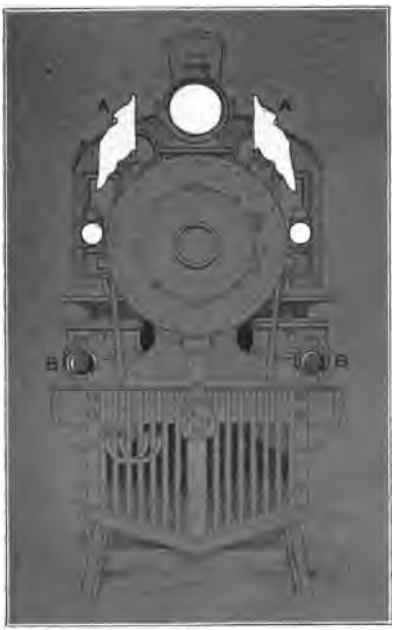
ENGINE RUNNING FORWARD BY NIGHT AS AN EXTRA TRAIN.

White lights and white flags at A A. See Rules 21 and D—21.



ENGINE RUNNING BACKWARD **BY DAY AS AN** EXTRA TRAIN, WITHOUT **CARS, OR AT THE** REAR OF A TRAIN PUSHING **CARS.**

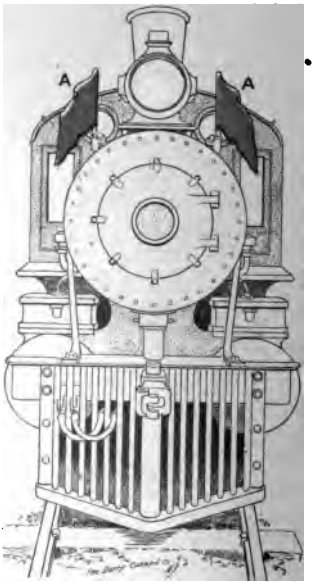
White flags at A A. See Rules 21 **and D—21.**
Green flags at B B, as markers. **See Rules 19 and** D—19.



ENGINE RUNNING BACKWARD BY NIGHT AS AN EXTRA TRAIN WITHOUT CARS, OR AT THE REAR OF A TRAIN PUSHING CARS.

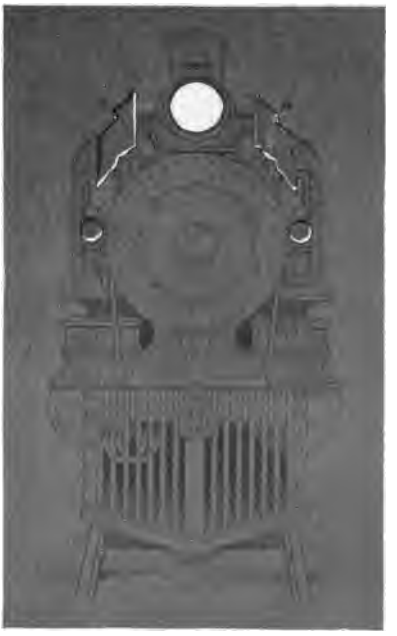
White lights and white flags at A A. See Rules 21 and D—21.

Lights at B B, as markers, showing green at side and in direction engine is moving and red in apposite direction. See Rules 19 and D—21.



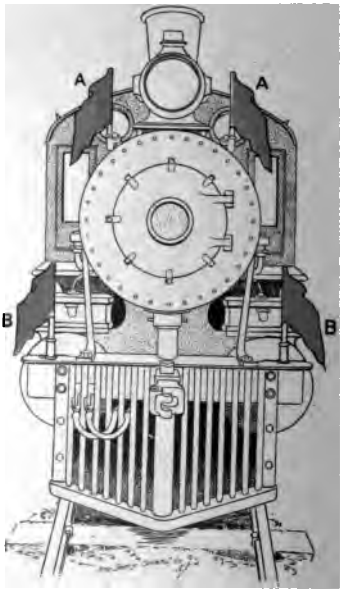
ENGINE RUNNING FORWARD BY DAY DISPLAYING SIGNALS FOR A FOLLOWING SECTION.

Green flags at A A. See Rules 20 and D—20.



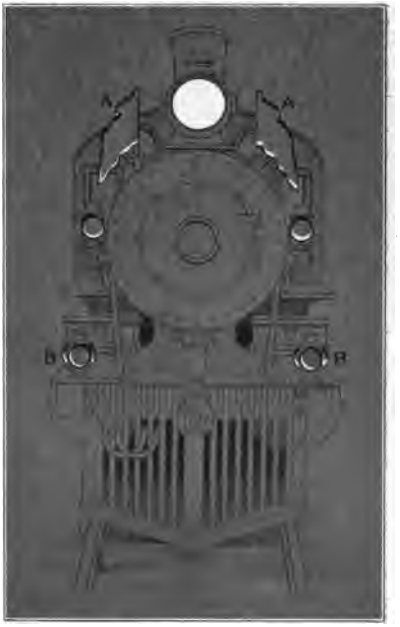
ENGINE RUNNING FORWARD BY NIGHT DISPLAYING SIGNALS FOR A FOLLOWING SECTION.

Green lights and green flags at A A. See Rules 20 and D—20.



ENGINE RUNNING BACKWARD BY **DAY, WITHOUT** CARS OR AT THE REAR OF A **TRAIN PUSHING** CARS, AND DISPLAYING **SIGNALS FOR A FOL-**LOWING SECTION.

Green flags at A A. See Rules 20 and D—20.
Green flags at B B, as markers. See Rules 19 and D—19.



ENGINE RUNNING BACKWARD BY NIGHT, WITHOUT CARS OR AT THE REAR OF A TRAIN PUSHING CARS, AND DISPLAYING SIGNALS FOR A FOLLOWING SECTION.

Green lights and green flags at A A. See Rules 20 and D—20.

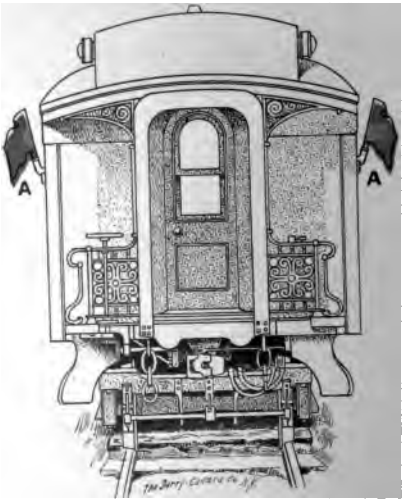
Lights at B B, as markers, showing green at side and in direction engine is moving and red in opposite direction. See Rules 19 and D—19.

REAR OF TRAIN BY NIGHT WHILE **RUNNING.**

Lights at A A, as markers, showing **green toward** engine and side, and red to **rear.** **See Rules** 19 and D—19.

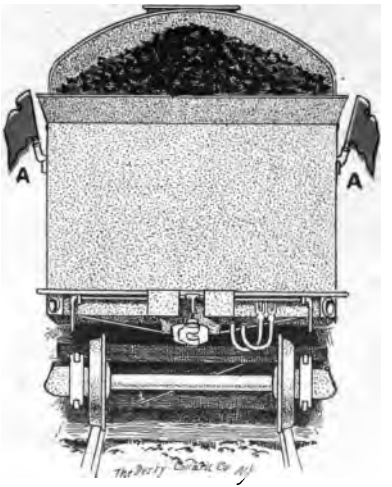
REAR OF TRAIN BY NIGHT WHEN ON SIDING TO BE PASSED BY ANOTHER TRAIN.

Lights at A A, as markers, showing green toward engine, side and to rear. See Rules 19 and D—19.



REAR OF TRAIN BY DAY.

Green flags at A A, as markers. **See Rules 19 and D—19.**



ENGINE RUNNING FORWARD BY DAY, WITHOUT CARS OR AT THE REAR OF A TRAIN PUSHING CARS.

Green flags, as markers. See Rules 19 and D—19.

ENGINE RUNNING FORWARD BY NIGHT, **WITHOUT** CARS OR AT THE REAR OF A **TRAIN PUSHING** CARS.

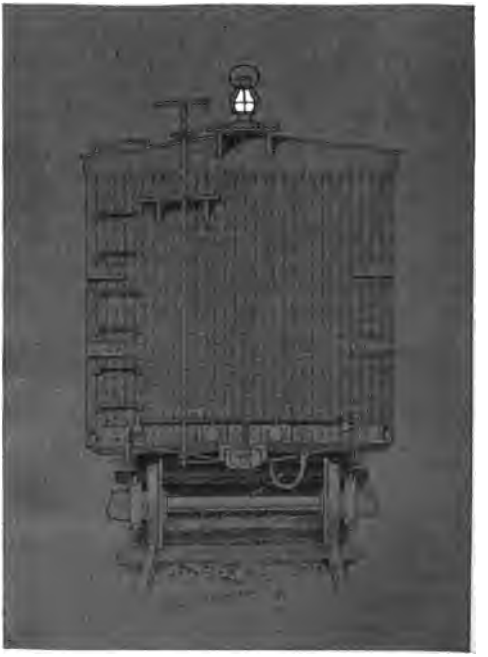
Lights at A A, as markers, showing **green to the front** and side, and red to rear. See **Rules 19 and D—19**

ENGINE RUNNING BACKWARD BY NIGHT WITHOUT CARS OR AT THE FRONT OF A TRAIN PULLING CARS.

White light at A.

PASSENGER CARS BEING PUSHED BY AN ENGINE BY NIGHT.

White light on front of leading car. **See Rules 24 and D—24.**



FREIGHT CARS BEING PUSHED BY AN ENGINE BY NIGHT.

White light on front leading car. See Rules 24 and D—24.

Index.

Abbreviations 153
Accident to one track 97
Air whistle signal 138
American custom of running 93
American Railway Association 11–14
Annulling a regular train 46
Arriving time 19
Association—American Railway 11–14
Audible signals 137
Automatic signals 95
Bell cord signals 138
Blocking trains with train order signals 84
Block signals—permissive 89
Blue flag 140
Caboose indicator 91
Canadian Pacific Railway 63–82
Caution, color for 96
Certificate of watch inspection 132
Changes of time 177
Chicago and Northwestern Railway 96
Class abolished 28–30
Class of train 18–25–30–140
Clearance 27
Clearance cards 21–88
Clearance—time required 142
Color for caution 96
Colors—night 96
Complete orders 33–125–148
Conductors' Exchange Register Ticket 91
Copies of messages 115
Crane for holding staff 31–32
Current of traffic 94–97–130
Date of adoption of standard rules 128
Days time table is in effect 18–24
Dead freight 47
Definitions 129
Delays 103
Diagrams 22–38
Disc type signals 95
Dispatcher 100–102
Dispatchers' office 125

Dispatchers—suggestions to 105
Dispatching department 117
Districts 21
Dividing points where time changes 177
Divisions 21
Double track rules 92-93-166
Enginemen 100
English custom of running 93
Examples ... 23-35-37-39-40-41-42-44-45-46-49-50-52-54-56-58-60-83-87-89-103-108-110-150-154
Extras 47-107-129-139
First telegraph order 8
Fixed signal 130-151
Flagman 53-55-144
Flags 16-135-140
Forms of train orders 154-172
Freight trains 19-23-25-27-37-48-52-106-108-111-119
Full faced type on time tables 134
Fusee 136
Hand signaling 152
History 7-8-11-14
Identification of trains 90
Initial point 21-24
Inspection of watches 132
Lake Shore and Michigan Southern Railway 67
Lap sidings 121
Lewis, Isaac 7
Local or "sun" time 14
Location of signals 120
Location of telegraph offices 118-120
Loss of time at signals 82
Mackie, John F. 5
Manifest freight 48
Manual controlled system 95
Markers 15-16
"Meet" orders 107-110
Minimum running time 20
Minot, Charles 7
Monroe—Erie Railway 7
Movement of trains 140-167
New England Railway—A 28
Night colors 96
Night work 106
Nineteen orders 34-35-114-147-193
O. K. orders 33
Operators—duties of 99
Operators—words to 97
Orders—for trains 32-34-49
Orders—forms for 34-36-49-191
Parallel sidings 123
Passenger trains 7-23-25-27-45
Passing siding 120

Pennsylvania Railroad 86–120
Permissive block signals..... 89
Pilot 131
Planning the work 126
Protecting trains 162
Pushing cars 145
Register stations..... 21–83
Register tickets.....86–91
Reports of passing trains.....98
Right angle semaphore.....68–74–95
Right by direction 27
Rights of trains.....25–26
Rules for double track 93
Rules—see Train Rules.
Rules—general 21
Rules—special 21
Running time..... 20
Safety.....9–34–57
Santa Fe Railway..... 30
Schedule 17–18–21–26–130
Schedule, extra 30
Sections.....129–144
Semaphore signals 66–68
Semaphore—Universal 85
Signal rules 135
Signal whistles.....137–140
Signals.....15–16–32–65–68
Signals—audible.....137
Signals—fixed 130–151
Signals—hand 152
Signals—night 135
Signals—use of 140
Signals—visible.....136
Signing order..... 33
Single track.....5–26–146
Special 30
Special rules..... 21
Staff—crane for.....31
Staff instrument 29–32
Standard time 14
Standard time sections.....177
Standard Code of Train Rules.11–13–26–32–51–62–68–128–132
Steam whistle signal 137
Stewart, W. H..... 7
Sun or local time 14
Switches must be closed 145
Target signal..... 65
Telegraph offices—location of 118–120
Terminals 21–23–24
Three position signals.....67
Three track running 94
Thirty-one order 34–147–191

Ticket for registering 86
Time Convention—1883 11
Time freight 48
Time needed to secure orders 104
"Time" orders 107
Time of arrival 19
Time of departure 18
Time—running 20
Time—standard 11–14–177
Time tables 17–21–23–133
Times at stations 18
Torpedo signals 138
Trainmen 100–102
Train despatchers 5–8–9
Train—definition of 15–129
Train orders 32–34–36–40–45–50–154–172–191
Train order signals 65–83
Train rights 25–26–27
Train registers 85
Train signals 138
Train rules—special 21
Train rules—standard code 11–13
Trains and train signals 15–32–138
Trains—classification of 140
Trains—movements of 140–167
Turners—Erie Railroad 7
Two locomotives on train 16
Union Pacific Railway 96
Universal semaphore 85
Visible signals 136
"Wait" orders 109
Watch inspection 132
Whistle signals—air 138
Whistle signals—steam 137
Work trains 57–144
Yard 130
Yard engine 131
Yard limits 21